Guide to Otological Specimens, Surgical Anatomy of Temporal Bone, Museum of Royal College of Surgeons, England.

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GUIDE TO AND CATALOGUE OF SPECIMENS

ILLUSTRATING THE

SURGICAL ANATOMY OF THE TEMPORAL BONE

IN THE MUSEUM OF

THE ROYAL COLLEGE OF SURGEONS OF ENGLAND

BY

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PREFACE

THE specimens are shown in the Upper Gallery of Room II.

The bones illustrating the surgical anatomy of the temporal bone are placed in glass cases round the balcony. Most of them have been sectioned, many more than once, in a vertical manner behind the meatus through the antrum, mastoid process, and some part of the labyrinth; horizontal section has been made in some when it was thought it would be of interest.

They are arranged in four series.

(1) Single bones, arranged according to age.

(2) Single bones, arranged according to the type of interior.

(3) Both bones from the same individual, arranged according to age, the males and females being in separate groups.

(4) Bones illustrating special anatomical facts or peculiarities and surgical procedures.

The specimens throughout the four series are numbered continuously, and the decimal system has been used so that a specimen may be easily found and additions made.

In Series 3 one number serves for both bones; if reference in the guide is made to one of a set, the side is indicated by R or L.

The specimens illustrating the Pathology are in three groups.

(1) The historical collection of Toynbee, which

remains untouched, and the catalogue of which is as he wrote it.

(2) Specimens forming the nucleus of a modern collection are placed under glass shades on shelves round the gallery, and are separately catalogued on the card system. These are also numbered on the decimal system to allow of additions.

(3) Microscopical sections, also separately catalogued and numbered on the decimal system.

The guide must not be considered exhaustive or complete ; it is meant to assist those who are interested in the study of the temporal bone.

The specimens, unless otherwise stated, are from my own collection.

The glass cases can be opened on application to the Curator and entering the name and address in a book kept for the purpose. Great care should be taken in replacing specimens in their proper places after examination.

ARTHUR H. CHEATLE.

GUIDE

Antrum. The antrum is the upper and back part of the middle ear tract, and is never absent. The lining membrane is continuous with that of the lower middle ear.

— formation of, 1·1, 2·1, 3·1, 5·1, 6·1, 7·1, 8·1, 9·1, 10·1, 11·1.

— roof of, is always thin, and is formed by the tegmen antri of the petrous overlapping the horizontal process of the squama (petro-squamosal suture), and is continuous with the roof of the lower middle ear. The petro-squamosal sinus runs across it *q. v.*, and has venous communication with the middle-ear tract. The free edge of the squama often projects into the antrum, and may have cells on each side of it. 61·1, 269·1, 294·1, 418·1.

— — depression of, see "Guides to antrum," "Macewen's triangle fallacious (2) and (3)."

— — removed, 36·1, 98·1, 99·1, 100·1, 101·1.

— outer wall of, this should be studied under "Fœtal cells," "Types," and "Guide to antrum."

— — cells in, which might be mistaken for the, 97·1, 258·1.

— antero-internal wall of, formed by the petrous, abuts against the semicircular canals, especially the external. See "Labyrinth," "Types," and "Cellular extension from inner wall of middle-ear tract," also 59·1, 155·1, 665·1, 675·1.

— postero-internal wall of, formed by the petrous portion, separates the antrum from the posterior

fossa, and is in relation to the cerebellum or lateral sinus, or both. This wall is of the highest importance; it is often very thin, and infection commonly spreads through it to the cerebellum internally to the lateral sinus and to the lateral sinus itself; it is of special importance in the diploëtic and dense infantile types, *q. v.* A few important specimens are referred to here, 98·1, 99·1, 116·1, 124·1, 163·1, 164·1, 174·1, 184·1, 194·1, 217·1, 340·1, 371·1, 375·1, 384·1, 386·1, 391·1, 392·1.

Antrum, opening of into attic is triangular, with the base upward formed by the common roof; the inner wall formed by the anterior crus of the external semicircular canal, and the outer by the descending portion of the squama. The external canal is frequently opened by disease, especially in the diploëtic and dense infantile types. 58·1, 96·1, 98·1, 99·1, 100·1, 108·1. See "Labyrinth," also "Supra-meatal spine."

— spread of cells from, see "Types, cellular."

— large, 35·1, 37·1, 51·1, 70·1, 75·1, 79·1, 102·1, 116·1, 121·1, 124·1, 164·1, 192·1, 204·1, 217·1, 252·1, 255·1, 263·1, 264·1, 306·1, 311·1, 329·1, 337·1, 340·1, 357·1, 382·1, 461·1, 471·1, 476·1, 538·1, 579·1, 587·1, 594·1, 596·1, 606·1, 617·1, 620·1, 629·1, 638·1, 647·1.

— small, 73·1, 105·1, 112·1, 126·1, 142·1, 158·1, 203·1, 212·1, 218·1, 236·1, 254·1, 272·1, 279·1, 292·1, 297·1, 322·1, 366·1, 377·1, 381·1, 387·1, 395·1, 398·1, 402·1, 437·1, 576·1, 578·11, 599·1, 613·1, 619·1.

— asymmetry in size of:
  Right the larger, 546·1, 558·1, 620·1.
  Left the larger, 571·1.

— guides to:
  Macewen's triangle, 108·1, 116·1, 228·1, 662·11.

Supra-meatal spine, 104·1, 128·1, 391·1, 392·1, 423·1, 424·1, 425·1.

Antrum, Macewen's triangle fallacious as guide to:

(1) High lying to Macewen's triangle, more common in cellular types:

In acellular types, 190·1, 218·1, 259·1, 270·1, 271·1, 279·1, 312·1, 331·1, 346·1, 366·1, 382·1, 390·1.

Symmetrical, 521·1, 528·1, 584·1.

In cellular types, 81·1, 121·1, 142·1, 148·1, 151·1, 165·1, 180·1, 192·1, 195·1, 197·1 198·1, 212·1, 213·1, 215·1, 219·1, 223·1, 231·1, 235·1, 237·1, 240·1, 249·1, 252·1, 260·1, 263·1, 264·1, 269·1, 272·1, 274·1, 275·1, 278·1, 281·1, 283·1, 284·1, 285·1, 288·1, 304·1, 306·1, 311·1, 317·1, 327·1, 329·1, 330·1, 337·1, 339·1, 340·1, 342·1, 345·1, 352·1, 357·1, 359·1, 360·1, 362·1, 427·1, 430·1, 431·1, 433·1, 434·1, 437·1, 439·1, 442·1, 443·1, 445·1, 458·1, 459·1, 462·1, 467·1, 474·1, 476 1, 478·1, 486·1, 493·1, 494·1, 495·1, 501·1.

Symmetrical, 514·1, 527·1, 537·1, 539·1, 545·1, 548·1, 558·1, 561·1, 561·12, 572·1, 574·1, 589·1, 590·1, 590·14, 603·1, 634·1.

Asymmetrical, 571·1, 542·12.

(2) High lying to Macewen's triangle with middle fossa dipping down externally to the antrum.

In acellular types, 190·1, 236·1, 378·1.

Asymmetrical, 521·1.

In cellular types, 432·1.

Asymmetrical, 564·1.

(3) Macewen's triangle leading to dura mater, the middle fossa dipping down.

In acellular types, 146·1, 326·1, 328·1.

Symmetrical, 599·1.

Asymmetrical, 581·1, 627·1, 633·1, 645·1.
In cellular types, 131·1, 229·1, 258·1, 265·1, 281·1, 351·1, 354·1, 361·1, 365·1, 418·1.
Symmetrical, 544·1, 629·1, 630·1.
Asymmetrical, 541·1, 567·1, 571·1, 602·1, 606·1, 609·1, 628·1, 631·1, 637·1, 642·1, 644·1.
(4) Macewen's triangle leading to lateral sinus, see "Lateral sinus, very forward."
Asymmetry of types, see "Types."
Attic, see "Middle-ear tract, formation of," and 95·1, 96·1, 108·1.
Apical diploë invaded by cells, see "Diploë apical."

Birth, temporal bone at, 6·1, 7·1, 8·1, 9·1, 10·1, 11·1, 12·1.
Bezold's perforation, bones favouring, 153·1, 234·1, 565·1 (R).

Carotid canal, relation of, to the middle ear and labyrinth, 60·1, 132·1, 162·1, 310·1, 448·1.
— — cells in relation to, 162·1, 448·1, 521·12 (L).
Chorda tympani nerve, 518·1 (R), 556·1 (R), 652·1.
Cochlea, see "Labyrinth."

Dense infantile type, see "Types of temporal bone, acellular."
Digastric bulla, 151·1, 354·1, 454·1, 496·1, 498·1, 517·1 (R), 541·1 (R), 558·1 (L), 562·1 (R), 582·1 (R and L), 620·11 (R), 634·1 (R and L), 640·1 (R and L).
Diploë, arrangement of, in early life throughout the temporal bone, 13·1, 15·1, 19·1, 20·1, 24·1, 25·1, 26·1, 27·1, 30·1, 33·1, 38·1, 39·1, 44·1, 45·1, 50·1, 53·1, 55·1, 59·1, 63·1, 73·1, 74·1, 92·1, 408·1, 504·1.
Diploë, apical or internal diploëtic mass invaded by cells from the middle-ear tract, 154·1, 162·1, 267·1, 448·1, 489·1, 497·1, 502·1, 503·1, 521·12 (L),

558·1 (R), 562·1 (R), 597·1 (R), 628·1 (R and L), 634·1 (L).
Diploë, apical, replaced by dense bone, 629·1 (R and L).
Diploëtic infantile types, see "Types of temporal bone, acellular."

Eustachian tube, see "Middle ear, formation of," also 60·1, 98·1, 132·1, 162·1, 448·1.

Fœtal life, temporal bone in, 1·01, 1·1, 2·1, 3·1, 4·1, 5·1.
— cells, or the cells lining the inner aspect of the outer antral wall present in *all* types, 5·1, 7·1, 32·1, 36·1, 149·1, 231·1, 235·9, 465·1.
Facial nerve, course of the, and relation to the labyrinth and middle ear, 658·1, 659·1, 660·1, 661·1, 662·1, 664·1, 668·1, 669·1.
— — and its relation to the radical operation, 108·1, 228·1, 661·1, 662·1.
— — and its relations to the labyrinthine operations, 660·1, 662·1, 669·1, 676·1, 677·1, 678·1, 679·1.
— — descending part of, and its relations, 28·1, 33·1, 42·1, 55·1, 72·1, 80·1, 84·1, 85·1, 86·1, 127·1, 129·1, 159·1, 188·1, 189·1, 191·1, 333·1, 347·1, 357·1, 364·1, 379·1, 380·1, 381·1, 402·1, 413·1, 422·1, 430·1, 469·1, 486·1, 488·1, 494·1, 502·1, 509·14 (R), 519·1, 556·1, 569·1, 581·1, 662·1, 663·1.
— — — — in relation to mastoid cells, 129·1, 357·1, 466·1, 488·1, 494·1, 502·1, 521.
— — — — — sinus tympani or internal pyramidal recess, 33·1, 72·1, 159·1, 189·1, 430·1, 469·1, 486·1, 569·1, 581·1, 662·1.
— — — — — petrous cell, 42·1, 55·1, 80·1, 84·1, 85·1, 86·1, 381·1, 413·1.
— — — — — sulcus jugularis, 188·1, 33·1, 364·1, 519·1, 663·1.
— — — — — posterior semicircular canal, 667·1.

Facial nerve, descending part of, Hugh Jones's line as a guide to, in the radical operation, 661·1.
Fossa subarcuata, 31·1, 58·1, 61·6.

Jones's, Hugh, line, a guide to the descending part of the facial nerve in the radical operation, 661·1.
Jugular foramen, divided into two by bone, 316·1, 338·1.

Labyrinth, bony, and its relations, 12·1, 18·1, 19·1, 20·1.
23·1, 27·1, 29·1, 37·1, 44·1, 60·1, 77·1, 82·1, 89·1, 96·1, 98·1, 100·1, 106·1, 108·1, 132·1, 229·1, 269·1, 442·1, 475·1, 505·1, 506·1, 509·14, 664·1, 665·1, 666·1, 667·1, 668·1, 669·1, 670·1, 671·1, 672·1, 673·1, 674·1, 675·1.
— — cells in relation to, 129·1, 141·1, 151·1, 154·1, 162·1, 178·1, 189·1, 202·1, 228·1, 242·1, 267·1, 268·1, 277·1, 303·1, 349·1, 448·1, 452·1, 454·1, 466·1, 489·1, 497·1, 502·1, 503·1, 519·1, 521·12 (L), 523·1, 536·1, 538·1, 555·1, 558·1, 562·1, 574·1, 594·1, 597·1, 627·1, 628·1, 631·1, 634·1.
— — operations on, 89·1, 676·1, 677·1, 678·1, 679·1.
Lateral sinus. The right is more frequently larger and more forward than the left, and the sinus is more frequently forward in the acellular types of bone.
— — extremely forward, 94·1, 120·1, 123·1, 134·1, 159·1, 190·1, 215·1, 218·1, 252·1, 321·1, 322·1, 339·1, 379·1, 397·1, 549·1 (R and L), 557·1 (R and L), 575·1 (R), 581·1 (R), 616·1 (R), 621·1 (R).
— — very far back, 144·1, 202·1, 286·1.
— — left larger than right, 508·1, 509·1, 511·1, 515·1, 525·1, 531·1, 533·1, 534·1, 535·1, 537·1, 544·1, 547·1, 548·1, 550·1, 558·1, 561·1, 562·1, 570·1, 571·1, 572·1, 572·11, 577·1, 584·1, 585·1, 588·1,

601·1, 603·1, 608·1, 614·1, 619·1, 622·1, 629·1, 634·1, 650·1.

Lateral sinus, about equal in size, 600·1, 604·1.

— — very large, 94·1, 143·1, 148·1, 155·1, 322·1, 526·1 (R), 581·1 (R), 592·1 (R), 610·1 (R and L), 621·1 (R).

— — very small, 178·1, 190·1, 281·1, 385·1, 620·1 (L), 621·1 (L).

— — marked discrepancy in size of—

Right the larger, 542·12, 564·1, 567·1, 592·1 618·1, 620·1, 621·1, 632·1.

Left the larger, 544·1, 548·1, 603·1.

— — divided into two passages by membranous septum at upper part, see "Pathological Series," 106·1.

— — gaps in groove of, to mastoid cells, 212·1.

Macewen's triangle, guide to the antrum, see "Antrum."

— — fallacious, see "Antrum."

Mastoid cells, see "Types, cellular."

— — earliest sign of, 68·1, aged 1 year and 7 months.

— — gap in outer wall of, 276·1, 555·1.

— — gaps in posterior wall of, to lateral sinus, 212·1.

Meatus, cells in roof and floor of, see "Cellular types."

Membrane, tympanic, 1·1, 3·1, 11·1, 651·1, 653·1, 659·1.

— Shrapnell's, removed, 652·1.

Middle-ear tract, formation of, 1·1, 2·1, 3·1, 5·1, 6·1, 7·1, 8·1, 9·1, 10·1, 11·1.

— — opened from above, 36·1, 40·1, 41·1, 60·1, 98·1, 99·1, 100·1, 101·1.

— — inner wall of, 654·1, 664·1, 665·1.

— — anterior wall of, 58·1.

— — posterior wall of, 43·1, 58·1, 108·1. See also "Pyramidal recesses."

— — roof of, 269·1, 294·1, 418·1.

— — floor of, 5·1, 103·1, 135·1, 159·1, 239·1, 293·1, 321·1, 389·1, 461·1, 543·1 (R). See also cells in floor under "Cellular types" and "Sulcus jugularis."

Occipital bulla, 634·1 (L).
— diploë, cells invading the, 231·1, 258·1, 461·1, 502·1, 561·11 (R), 634·1 (L).
Ossicles in position, 1·1, 3·1, 5·1, 7·1, 11·1, 95·1, 654·1, 655·1.

Petro-squamosal sinus, grooving and foramina for the, 31·1, 33·1, 39·1, 45·1, 51·1, 69·1, 74·1, 123·1, 224·1, 226·1, 229·1, 279·1, 344·1, 348·1, 372·1, 391·1, 399·1, 400·1, 416·1, 430·1, 437·1, 489·1, 490·1, 501·1, 504·12, 509·1, 511·1, 512·1, 561·11, 576·1, 593·011, 615·1.
Petrous cell, the, 42·1, 80·1, 84·1, 85·1, 86·1, 90·1, 381·1, 413·1.
Pyramidal recess internal or sinus tympani, relations of, 5·1, 29·1, 33·1, 43·1, 58·1, 72·1, 77·1, 84·1, 106·1, 189·1, 267·1, 269·1, 272·1, 300·1, 315·1, 321·1, 330·1, 335·1, 362·1, 399·1, 413·1, 422·1, 430·1, 448·1, 451·1, 453·1, 469·1, 474·1, 480·1, 486·1. 492·1, 538·1, 569·1, 581·1, 656·1.
— — external, 5·1, 43·1, 189·1, 270·1, 272·1, 300·1, 321·1, 362·1, 422·1, 448·1, 451·1, 461·1, 467·1, 469·1, 471·1, 498·1.

Radical operation, 108·1, 228·1, 662·12.
— — guides to the antrum, see "Antrum."
— — Macewen's triangle fallacious as guide to, see "Antrum."
— — relation of facial nerve to, see "Facial nerve."
— — — of lateral sinus to, see "Lateral sinus."
— — — of external semicircular canal to, 661·1.

Schwartze operation, removing all cells and leaving the lower middle ear intact, 657·1, 657·11.
Semicircular canals, see "Labyrinth."
Sinus tympani, see "Pyramidal recess, internal."
Styloid process, upper end in middle-ear floor, 135·1.
— — with ossified stylo-hyoid ligament, 401·1, 572·11 (R).
Sulcus jugularis. The right is more frequently larger than the left.
— — left larger than right, 507·1, 508·1, 511·1, 522·1, 531·1, 533·1, 534·1, 535·1, 537·1, 547·1, 548·1, 550·1, 558·1, 561·1, 562·1, 570·1, 571·1, 572·1, 577·1, 584·1, 585·1, 588·1, 594·11, 595·1, 602·1, 607·1, 608·1, 609·1, 613·1, 614·1, 619·1, 622·1, 629·1, 634·1, 639·1, 650·1.
— — marked discrepancy in size:
  Right larger, 564·1, 641·1.
  Left larger, 603·1, 614·1, 561·11.
— — very large, 229·1, 350·1, 364·1, 382·1, 442·1, 543·1 (R), 587·1 (R and L).
— — small, 466·1, 544·1 (R and L), 561·11 (L).
— — high lying, 103·1, 135·1, 163·1, 188·1, 219·1, 229·1, 239·1, 293·1, 346·1, 347·1, 350·1, 364·1, 369·1, 382·1, 391·1, 439·1, 442·1, 453·1, 458·1, 461·1, 469·1, 475·1, 491·1, 527·1 (R), 545·1 (R), 549·1 (R), 551·1 (R and L), 639·1 (R and L), 644 (R).
— — relation to facial nerve, 188·1, 333·1, 364·1, 519·1 (R).
— — — to the posterior semicircular canal, 229·1, 442·1.
— — — to the mastoid cells, 304·1, 454·1, 469·1, 475·1, 484·1, 488·1, 497·1, 519·1, 521·12 (R and L), 523·1, 527·1 (R), 529·1 (R and L), 536 (R and L), 538·1 (L), 541 (R and L), 558·1 (R and

L), 562·1 (R), 594·1 (R and L), 597·1 (R and L), 601·1 (L), 618·1 (R and L), 627·1 (L), 631 (R and L).

Sulcus jugularis, relation to the internal pyramidal recess or sinus tympani, 84·1, 399·1, 430·1.

— — with foramen through from middle ear, evidently for a vessel, 159·1, 543·1.

Supra-meatal spine, marking the lower level of the opening of the antrum into the attic, 104·1, 391·1, 392·1, 423·1, 424·1, 425·1.

Symmetry of types, see "Types."

Types of temporal bone are here classified according to the interior, that is, according as to whether cells do or do not extend from the middle-ear tract into the surrounding diploë. The formation of the bone, and especially the arrangement of the diploë in infancy and early life, should therefore be first studied, 1·1 to 61·1, and "Diploë, arrangement of, in early life."

If cells do not form, a great deal of the diploë present in early life disappears during growth, especially behind and above the antrum, but the mastoid process remains diploëtic, and the infantile condition will persist all through life, but on a larger scale.

If cells do form they extend into and replace the diploë from some part of the middle-ear tract, which, of course, includes the antrum, and a distinct invasion line can always be distinguished between the cells and the diploë. The cells, therefore, always communicate directly or indirectly with some part of the middle-ear tract, and it will be seen that they may replace the diploë partly or wholly *wherever* it is present in infancy, and therefore to speak of *mastoid cells* only in describing the cellular development which may take place in the temporal bone is narrow and unscientific. The cellular development begins very early in life, and if it has not begun within the first five years of life, and perhaps much earlier, it is not going to occur at all. It is probable that the presence or absence of cellular formation is decided in fœtal life. The earliest sign of cell formation in the collection occurs in a male bone 1 year and 7 months of age. The cellular development probably ceases when full growth is attained ; one sees the same extent and limitation of cells at the age of eighty as in the early twenties. At present it is unknown what determines the formation and extent of cellular formation, but probably the density of the walls of the middle-ear tract abutting on the surrounding diploë is a factor in the former.

Unless the types are thoroughly appreciated the clinical and pathological problems which occur when once the middle-ear tract has become infected cannot be solved.

In the following lists it must be understood that examples are given, and therefore no accurate statistics can be made from them, but their frequency is broadly stated.

Types *in infancy and up to the age of one year and six months, inclusive.* The first three may continue all through life on an enlarged scale, and therefore the word "infantile" is applied to them in later life.

(1) Outer antral wall formed by the descending process of the squama consists of an outer layer of compact bone and an inner layer of cells—"fœtal cells." The mastoid mass formed partly by the overlapping descending process of the squama and the petrous is diploëtic and sepa-

rated by the thin layer of dense bone forming the walls of the antrum from the cavity of the antrum. It is called the "Diploëtic infantile type." 15·1, 16·1, 19·1, 20·1, 25·1, 27·1, 38·1, 39·1, 44·1, 45·1, 48·1, 50·1, 53·1, 55·1, 56·1, 57·1, 61·1, 63·1, 64·1, 65·1, 67·1, 504·1, 504·11, 504·12, 505·1, 505·11, 593·01, 593·011.

(2) The same as (1), but a thin layer of diploë runs through the outer antral wall between the outer compact layer and the inner cellular layer. This is a variation of (1), 24·1, 26·1.

(3) The same as (1), but the mastoid mass is very dense, 13·1, 30·1, 593·02 (R and L). It is called the "Dense infantile type."

In these three types not only are the mastoid cells absent all through life, but cells from other parts of the middle-ear tract so common in cellular types do not form.

(4) Those bones which are going to become cellular, as judged by their appearance. They have a large antrum, very cellular outer antral wall, and a thin partition between the antrum and the mastoid diploë. These are in the majority. 35·1, 37·1, 53·1, 57·1, 59·1, 67·1, 70·1, 593·05.

Types, **Acellular, or Infantile,** *between the ages of one year and seven months up to ten years, inclusive.*

(1) Diploëtic infantile type, 72·1, 74·1, 85·1, 86·1, 92·1, 103·1, 104·1, 105·1, 107·1, 111·1, 112·1, 118·1, 120·1, 123·1, 132·1, 506·1 (R and L), 508·1 (R and L), 509·1 (R and L), 512·12 (R and L), 593·01 (R and L), 593·02 (R and L), 593·03 (R and L), 593·04 (R and L), 593·1 (R and L).

(2) Diploëtic infantile type with layer of diploë in the outer antral wall, 71·1, 126·1, 509·14.

(3) Dense infantile type, *73·1, 77·1*, 82·1, 89·1, 91·1.

Types, **Acellular, or Infantile,** *over the age of ten years.*

(1) *Diploëtic infantile type, with dense outer antral wall.* It will be seen that as growth progresses the outer compact layer of the outer antral wall and the antral wall which separates the cavity of the antrum from the diploëtic mastoid mass become thicker, in some more than in others, and that the inner cellular lining to the outer antral wall is always present. This type is present in about 15 per cent. of people, and is as common in males as in females, and is seen at all ages. It is of the greatest importance to recognise this type for pathological and clinical reasons. If the antrum becomes infected, especially in measles, scarlet fever, and influenza, there can be no mastoid signs, for, on account of the density of the outer and lower antral walls, pus cannot perforate the outer wall or invade the mastoid process, and the infection may spread to the middle or posterior fossa or the labyrinth also without mastoid signs. If the drainage through the lower middle ear and membrane is free, the antrum small, and the infection not a virulent one, healing may take place, but what happens so frequently, if the infection is a virulent one, is that the lining membrane of the antrum is destroyed, the walls become carious, especially the outer cellular one, the tympanic membrane, ossicles, and outer attic wall, are more or less destroyed, and a chronic middle-ear suppuration results with formation of cholesteatoma, exuberant granulation, and occasionally local osteo-sclerosis of the antral walls, and with all the chances of further grave extensions which again take place without mastoid signs. See the Patho-

logical Series, "chronic middle-ear suppuration." In other words, the type is, apart from tuberculous infection, responsible for chronic middle-ear suppuration. If cells are present they are at once invaded from the antrum, forming a mastoid abscess, but if they are surrounded by dense bone, and especially if they are few in number, a chronic discharge may result as in the pure acellular type. 134·1, 136·1, 137·1, 138·1, 140·1, 145·1, 146·1, 155·1, 158·1, 163·1, 167·1, 168·1, 174·1, 175·1, 182·1, 190·1, 193·1, 199·1, 200·1, 201·1, 203·1, 204·1, 211·1, 218·1, 244·1, 248·1, 259·1, 270·1, 271·1, 279·1, 290·1, 291·1, 292·1, 297·1, 308·1, 310·1, 312·1, 313·1, 314·1, 321·1, 322·1, 324·1, 326·1, 328·1, 331·1, 334·1, 343·1, 344·1, 346·1, 353·1, 366·1, 376·1, 377·1, 378·1, 379·1, 380·1, 381·1, 382·1, 383·1, 384·1, 385·1, 386·1, 387·1, 388·1, 389·1, 390·1, 391·1, 392·1, 393·1, 394·1, 395·1, 396·1, 397·1, 398·1, 399·1, 400·1, 401·1, 513 (R and L), 515·1 (L), 518·1 (R), 520 (R), 521 (R and L), 522·1 (R and L), 526 (R and L), 528 (R and L), 531 (R and L), 533·1 (R), 534·1 (R), 540 (R), 546 (R and L), 549·1 (R and L), 550·1 (L), 554·1 (R), 555·1 (L), 555·11 (L), 557 (R and L), 565·1 (L), 568·1 (R and L), 570·1 (L), 572·11 (L), 573·1 (R and L), 578·1 (L), 583·1 (R and L), 584·1 (R and L), 585 (R and L), 591·1 (R), 604·1 (R and L), 605·1 (R), 607·1 (R), 608·11 (L), 609 (R), 611·1 (L), 612 (R and L), 613·1 (L), 615·1 (R), 619 (R and L), 620·1 (R and L), 621·1 (R), 622·1 (R and L), 627·1 (R), 633·1 (R), 637·1 (R), 644·1 (R), 645·1 (R and L), 646·1 (R).

Types, *diploëtic infantile, with dense outer antral wall,* asymmetrical, 515·1, 518·1, 520·1, 532·1, 534·1, 540·1, 550·1, 554·1, 555·1, 565·1, 570·1, 578·1, 591·1, 605·1, 607·1, 609·1, 611·1, 613·1, 615·1, 621·1, 627·1, 633·1, 637·1, 644·1, 646·1.

Types, *diploëtic infantile, with dense outer antral wall*, symmetrical, 512·12, 513·1, 521·1, 522·1, 526·1, 528·1, 531·1, 546·1, 549·1, 557·1, 568·1, 573·1, 583·1, 584·1, 585·1, 599·1, 604·1, 612·1, 619·1, 620·1, 622·1, 645·1.

— — — with large antrum, 382·1, 540·1 (R), 620·1 (R and L).

— — — with small antrum, 140·1, 158·1, 203·1, 204·1, 218·1, 292·1, 297·1, 376·1, 377·1, 381·1, 395·1, 398·1, 646·1 (R).

— — — with thin postero-internal antral wall, 163·1, 174·1, 371·1, 375·1, 384·1, 386·1, 391·1, 392·1, 393·1, 521·1 (R), 540·1 (R), 604·1 (R).

— — — with pushing forwards of the postero-internal antral wall, 184·1, 400·1.

— — — with particularly thick, dense outer antral wall, 155·1, 398·1.

— — — with high lying antrum, 190·1, 218·1, 259·1, 270·1, 271·1, 279·1, 312·1, 333·1, 346·1, 366·1, 382·1, 390·1, 521·1 (R and L), 528·1 (R and L), 584 (R and L).

— — — — — — and forward lateral sinus, 218·1, 259·1, 270·1, 271·1, 312·1, 346·1. 390·1.

— — — — — — depression of the middle fossa, and forward lateral sinus, 193·1, 366·1, 378·1.

— — — with very forward lateral sinus, 190·1, 321·1, 322·1, 379·1, 397·1, 526·1 (R and L), 549·1 (R and L), 620·1 (R), 621·1 (R).

— — — with depression of the middle fossa, 146·0, 168·1, 193·1, 290·1, 326·1, 328·1, 387·1, 599·1 (R and L), 627·0 (R), 633·1 (R), 637·1 (R), 644·1 (R), 645·1 (L).

(2) *Diploëtic infantile type with diploë running through the outer antral wall.* Somewhat rare in

adult life, and accounts for cases of infection running an osteo-myelitic course. 164·1, 254·1, 296·1, 403·1, 509·1 (R and L), 581·1 (R and L), 604·1 (L).

(3) *Dense infantile type, mastoid process very dense.* A rare condition occurring in about 2 per cent. of all people, and having the same pathological significance as the pure diploëtic infantile type. 404·5, 405·1, 406·1, 407·1, 593·02 (R and L), 599·1 (R and L).

Types, **Cellular.** When the antrum becomes infected, wherever cells are present there may pus spread and penetrate. In describing these types the terms upper and lower mastoid are used. The former extends from the apex of the antrum to the level of the projecting portion or lower mastoid. The majority of bones are cellular.

— — *Formation of cells up to the age of* 21 *years.*

Single bones: 68·1 (1 year, 7 months), 78·1 (2 years), 79·1 (2 years), 81·1 (2 years), 83·1 (2 years), 84·1 (2 years), 87·1 (2 years, 6 months), 88·1 (2 years, 6 months), 95·1 (3 years), 97·1 (3 years, 6 months), 102·1 (4 years), 106·1 (5 years), 109·1 (6 years), 110·1 (6 years), 113·1 (6 years), 114·1 (6 years), 115·1 (6 years), 116·1 (6 years), 117·1 (7 years), 119·1 (7 years), 122·1 (7 years), 124·1 (8 years), 125·1 (8 years), 127·1 (9 years), 128·1 (9 years), 129·1 (9 years), 130·1 (10 years), 131·1 (10 years), 133·1 (11 years), 135·1 (11 years), 139·1 (14 years), 141·1 (15 years), 142·1 (16 years), 143·1 (16 years), 144·1 (16 years), 147·1 (16 years), 148·1 (17 years), 149·1 (17 years), 150·1 (17 years), 151·1 (18 years), 153·1 (18 years), 154·1 (18 years), 156·1 (19 years), 157·1 (19 years), 159·1 (20 years), 161·1 (20 years), 162·1 (21 years), 165·1 (21 years), 166·1 (21 years), 409·1, 410·1, 411·1, 412·1, 413·1, 414·1, 415·1, 416·1.

Double bones: Male, 507·1 (2 years), 509·11 (6 years), 509·12 (6 years), 509·13 (6 years, 6 months), 509·14 (6 years, 6 months), 509·15 (7 years, 6 months), 510·1 (8 years, 6 months), 511·1 (9 years), 512·1 (9 years), 512·11 (9 years), 513·4 (14 years), 514·1 (16 years), 515·1 (17 years), 516·1 (20 years), 516·2 (21 years).

Female, 594·1 (2 years), 594·11 (2 years, 4 months), 594·2 (5 years), 595·1 (6 years), 596·1 (6 years), 596·11 (6 years), 596·12 (6 years), 596·13 (6 years), 597·1 (16 years), 597·11 (16 years), 598·1 (21 years).

Types, **Cellular,** *examples of after the age of 21 years.* This classification is based on the amount of cellular formation in the outer antral wall and mastoid. The extension to other parts of the diploë are classified after.

(1) *Dense outer antral wall with cells in the upper mastoid.* A fairly common type. Many of these have the same pathological importance as the diploëtic infantile type. 419·1 to 437·1 inclusive.

(2) *Dense outer antral wall, with a narrow track of cells in a dense upper mastoid, the lower mastoid being diploëtic.* This type has the same pathological importance as the diploëtic infantile type. 362·1, 530·1 (R), 590·1 (L).

(3) *Dense outer antral wall, with a narrow track of cells passing through an entirely dense mastoid.* This type, which is rare, has the same pathological importance as the diploëtic infantile type. 285·1, 438·1.

(4) *Dense outer antral wall, with cells throughout the mastoid and diploë at the tip.* 187·1, 191·1, 250·1, 266·1, 269·1, 275·1, 537·1 (L), 550·1 (R), 563·1 (L).

(5) *Dense outer antral wall, with cells throughout the mastoid, and no diploë at the tip.* There are few cellular types in which the entire diploë has disappeared from the lower mastoid. 209·1, 240·1, 332·1, 350·1, 571·1 (R).

(6) *Dense outer antral wall, with narrow track of cells in the upper mastoid leading to large cells in the lower mastoid.* 22·1, 273·1, 293·1, 319·1, 341·1.

(7) *Cellular outer antral wall and upper mastoid and diploëtic lower mastoid.* 439·1 to 445·1, inclusive.

The same with a large cell in the outer antral wall, which might be mistaken for the antrum. 205·1, 216·1.

(8) *Cellular outer antral wall and throughout the mastoid, with diploë at the tip.* This is the most common type of all. 446·1 to 493·1.

(9) *Cellular outer antral wall and entire mastoid, with no diploë at the tip.* 494·1 to 503·1, inclusive.

(10) *A large cell which might be mistaken for the antrum, in the outer antral wall, with a series of large cells running downwards and inwards to the digastric fossa, and invading the occipital diploë. The entire mastoid is diploëtic.* This is a very rare variety, and if infection of the antrum occurred pus could reach the neck without passing through the mastoid. 258·1.

Types, **Cellular**, *extension of cells into other parts of the diploë.*

Upwards into the squama, 97·1, 117·1, 121·1, 129·1, 275·1, 307·1, 357·1, 496·1, 500·1.

Upwards and backwards, 242·1, 260·1, 450·1, 503·1, 521·12 (L), 552·2 (L).

Forwards into the roof of the meatus and zygoma, 129·1, 144·1, 150·1, 165·1, 179·1, 195·1, 227·1, 461·1, 535·1 (R and L), 558·1 (R and L).

Forwards into the floor of the meatus, 521·12 (L).

Outwards from the antrum, with the outer antral wall in an otherwise acellular bone of the diploëtic infantile type, 605·1 (L), 637·1 (L).

Backwards from the antrum in an otherwise acellular bone of the diploëtic infantile type, with dense outer antral wall—a rare condition, 555·11 (L).

Backwards over the lateral sinus and behind the antrum, 195·1, 222·1, 230·1, 307·1, 493·1, 496·1, 537·1 (R), 550·11 (L), 642·1 (L).

Inwards over and under the lateral sinus, 185·1, 454·1, 483·1, 602·1 (L), 627·1 (L).

Inwards to the digastric fossa, 151·1, 156·1, 225·1, 236·1, 258·1, 286·1, 341·1, 354·1, 454·1, 466·1, 496·1, 498·1, 502·1, 503·1, 517·1 (R), 545·1 (R), 558·1 (L), 562·1 (R), 582·1 (R and L), 618·1 (R and L), 634·1 (R and L), 640·1 (R and L), 647·1 (R and L).

Inwards to the occipital fossa, 225·1, 240·1, 466·1, 634·1.

Inwards up to and invading the occipital diploë, 231·1, 258·1, 461·1, 502·1, 541·1, 561·11 (R), 623·11 (R.), 634·1 (R and L).

Inwards to the descending part of the facial nerve, 357·1, 466·1, 488·1, 494·1, 502·1, 519·1 (R and L), 535·1 (L), 556·1.

Inwards to the sulcus jugularis, 143·1, 227·1, 304·1, 333·1, 341·1, 349·1, 509·11 (R), 523·1, 529·1, 475·1, 484·1, 488·1, 521·12 (R), 527·1 (R), 541·1 (R and L), 571·1 (L), 601·1 (L), 618 (R and L), 627·1 (L), 650·1 (L).

Inwards over the sulcus jugularis and under the labyrinth to the lower part of the internal diploëtic mass or apical diploë. 189·1, 202·1, 466·1, 489·1, 497·1, 503·1, 521·12 (L), 538·1 (L), 558·1 (R), 562·1 (R), 631·1 (R and L), 634·1 (L).

Inwards over the lateral sinus and under the semicircular canals, 277·1

Inwards behind the labyrinth under the internal auditory meatus and invading the apical diploë. 154·1, 521·12 (L).

Inwards from the middle-ear tract:

From the front in relation to the internal carotid artery, "Eustachian cells." 162·1, 448·1, 521·12 (L).

In front of the loop of the superior semicircular canal, 78·1.

Over the loop of the superior semicircular canal, 97·1, 303·1.

Through the loop of the superior semicircular canal, 129·1, 242·1, 502·1, 503·1, 603·1 (L).

Behind the loop of the superior semicircular canal, 154·1.

From the floor, 141·1, 162·1, 178·1, 228·1, 267·1, 268·1, 330·1, 448·1, 452·1, 489·1, 519·1 (L), 523·1 (L), 574·1 (R and L), 594·1 (R and L), 597·1 (R and L).

Cells invading the apical diploë or internal diploëtic mass from various parts, 154·1, 162·1, 267·1, 448·1, 489·1, 497·1, 502·1, 503·1, 521·12 (L), 558·1 (R), 562·1 (R), 597·1 (R and L), 628·1 (R and L), 634·1 (L).

Types, *symmetry*, *examples of*—

Acellular, 504·1, 504·11, 504·12, 505·1, 506·1, 509·1, 512·12 513·1, 521·1, 522·1, 526·1, 528·1, 531·1, 546·1, 549·1, 557·1, 568·1, 573·1, 583·1, 584·1, 585·1, 593·1, 599·1, 604·1, 612·1, 619·1, 620·1, 622·1, 645·1.

Cellular, 510·1, 514·1, 527·1, 529·1, 532·1, 535·1, 536·1, 538·1, 542·1, 543·1, 544·1, 551·1, 556·1, 559·1, 561·1, 566·1, 569·1, 574·1, 576·1, 577·1, 580·1, 582·1, 586·1, 587·1, 589·1, 594·1, 594·11, 595·1, 596·1, 597·1, 598·1, 600·1, 603·1, 606·1, 608·1, 610·1, 614·1, 617·1, 618·1, 624·1, 626·1, 628·1, 629·1, 631·1, 632·1, 635·1, 636·1, 640·1, 643·1, 647·1.

Types, *asymmetry of.* Gross asymmetry which would affect an X-ray photograph or a pathological process is present in about 7 per cent. of cases.

Acellular one side, more or less cellular the other. 507·1, 515·1, 518·1, 520·1, 525·1, 533·1, 540·1, 550·1, 554·1, 555·7, 555·11, 565·1, 570·1, 578·1, 581·1, 591·1, 605·1, 607·1, 608·11, 609·1, 611·1, 613·1, 615·1, 621·1, 627·1, 633·1, 637·1, 644·1, 646·1, 572·11.

Right side, acellular in, 17.

Left side, acellular in, 13.

— — — cellular distribution not uncommon, and might not show with X-rays, but would influence the spread of infection. 509·15, 511·1, 512·1, 516·7, 517·1, 519·1, 521·11, 521·12, 523·1, 524·1, 530·1, 537·1, 539·1, 541·1, 545·1, 547·1, 548·1, 552·1, 553·1, 558·1, 560·1, 561·11, 562·1, 563·1, 564·1, 567·1, 571·1, 572·1, 575·1, 579·1, 588·1, 590·1, 592·1, 601·1, 602·1, 623·1, 625·1, 630·1, 634·1, 638·1, 639·1, 641·1, 642·1, 650·1.

Vein, mastoid canal. As a rule, the right is larger than the left. 632·1 (L).

Left larger than right, 539·1, 549·1, 567·1, 603·1, 608·1.

Equal in size, 617·1.

Marked discrepancy in size, 517·1, 609·1.

Large, 255·1, 284·1, 346·1, 377·1, 424·1, 437·1, 463·1, 498·1, 517·1 (R).

Small, 419·1, 438·1.

Absent, 550·1 (R and L), 650·1 (R and L).

Beginning single and emerging double, 303·1, 520·1 (L), 526·1 (R and L), 592·1 (R).

Multiple, 285·1, 309·1, 348·1, 429·1, 437·1, 458·1, 468·1, 470·1, 526·1 (R and L).

Asymmetrical as to number, 520·1, 563·1, 592·1, 613·1, 633·1.

Relation to mastoid cells, 496·1.

Running straight upwards, 422·1.

Sulcus at exit, 487·1, 512·1 (R), 633·1 (R), 634·1 (L).

Emerging far back, 487·1, 377·1.

CATALOGUE OF SPECIMENS ILLUSTRATING THE SURGICAL ANATOMY OF THE TEMPORAL BONE.

FIRST SERIES.

SINGLE SPECIMENS ARRANGED ACCORDING TO AGE.

1·01 to 367·1 inclusive.

1·01. SOME FEATURES OF THE AUDITORY APPARATUS OF A 16 MM. HUMAN EMBRYO, AS SHOWN IN A RECONSTRUCTION MODEL (BY THE WAX-PLATE METHOD OF BORN). RIGHT SIDE.

External ear: The embryonic tubercles of the pinna have fused, but are still indicated. The external auditory meatus is expanded internally. In the model the plug of epithelial cells has been removed to show the form of the meatus.

The labyrinth: The vestibule is compressed laterally and is somewhat quadrilateral in form. The semicircular canals are in an advanced stage of development compared with the cochlea, which is represented by a simple tube turning on itself at its tip. The cochlear element of the labyrinth lies close to the roof of the pharynx, considerably internal to the orifice of the primitive Eustachian tube, and comparatively close to the sagittal plane. The ductus endolymphaticus is large and long.

The region of the middle-ear tract: The Eustachian tube, tympanic cavity, and antrum are represented by the first pharyngeal pouch in its more or less primitive condition. Superiorly, the pouch is forming an acute fissure, and at its outer extremity is turning upwards to invade the mesoblast between the labyrinth and the external auditory meatus; incus, malleus, and Meckel's cartilage are represented as one continuous mass. Microscopically Meckel's bar is cartilaginous in the lower part, but malleus and incus are still in the mesoblastic state and differentiated only by concentration of cells. The process from the bar in backward direction is the great process of the malleus. The incus has a thin process backwards and inwards, to fuse with the mesoblastic anlage of the stapes. The articulations have not yet been differentiated. The hyoid bar—in a prechondral stage—is seen passing upwards on the inner side of the facial nerve. The upper extremity of the hyoid bar bifurcates, the anterior portion being directly continuous with the stapes. The facial nerve lies in the fork so formed. There is a large vein lying to the outer side of the horizontal portion of the seventh cranial nerve, to the inner side of the malleus and incus, and below the external semicircular canal. It is connected posteriorly with the internal jugular vein, and anteriorly with a venous plexus internal to the Gasserian ganglion. There is another large sinus channel, in the position somewhat of the petro-squamosal sinus, lying above the semicircular canals.

Presented by G. J. Jenkins, Esq., F.R.C.S., 1914.

1·1. RIGHT AND LEFT. FŒTUS, FIFTH MONTH.

Right.—Squamo-zygomatic portion removed showing the inner wall of the antrum. Membrane and ossicles in position.

Left.—Entire.

2'1. RIGHT AND LEFT. FŒTUS, SIXTH MONTH.

Both bones separated into component parts.

3'1. LEFT. FŒTUS, SIXTH MONTH.

Squamo-zygomatic portion separated. Membrane and ossicles in position.

4'1. RIGHT. FŒTUS, ABOUT SEVENTH MONTH.

Petrous portion.

5'1. RIGHT. FŒTUS, EIGHTH MONTH.

Squamo-zygomatic portion separated from the petrous. Tympanic ring attached to squamo-zygomatic. Malleus and incus in position. Stapes in oval window. Cells lining the inner aspect of the outer antral wall "fœtal cells." These cells are always present, and are quite distinct from other cells which may form later in life. External and internal pyramidal recesses in posterior wall of middle ear well marked. The posterior edge of the floor turning upwards as a free border forming a pocket.

6'1. RIGHT. AT BIRTH.

Entire, but the membrane and ossicles are removed.

7'1. LEFT. AT BIRTH.

Squamo-zygomatic portion with the tympanic ring separated. Ossicles remaining in position. Inner aspect of outer antral wall is cellular.

8'1. RIGHT. AT BIRTH.

Squamo-zygomatic with attached tympanic ring separated from the petrous. Membrane and ossicles removed. A wire passes through course of facial nerve.

9·1. LEFT. AT BIRTH.

Squamo-zygomatic with attached tympanic ring separated from the petrous. Membrane and ossicles removed.

10·1. RIGHT. AT BIRTH.

Squamo-zygomatic with attached tympanic ring separated from the petrous, showing middle-ear tract.

11·1. LEFT. AT BIRTH.

Squamo-zygomatic portion and tympanic ring with membrane and ossicles in position.

12·1. LEFT. AT BIRTH.

Bony labyrinth dissected out.

13·1. RIGHT. MALE, 2 DAYS.

Dense mastoid diploë. This condition may continue all through life and is described as the *Dense infantile type.* For instance see 30·1, 404·1, 405·1, 406·1, 407·1, 599·1.

14·1. RIGHT. MALE, 3 DAYS.

Separated into component parts.

15·1. RIGHT. MALE, 6 DAYS.

Twice sectioned through the antrum, mastoid mass, vestibule and internal auditory meatus. This condition may continue all through life and is described as the *Diploëtic infantile type.*

16·1. RIGHT. SOON AFTER BIRTH.

Twice sectioned through the antrum, mastoid mass, vestibule and internal auditory meatus.

17·1. RIGHT. MALE, 1 MONTH.

Entire. External and internal pyramidal recesses very marked. Facial canal open above the oval window.

18·1. LEFT. FEMALE, 1 MONTH.

Dissected to show the semicircular canals. Cochlea opened from above. Wire passes along course of facial nerve.

19·1. RIGHT. INFANT OF A FEW WEEKS.

Twice sectioned through the middle ear, vestibule and internal auditory meatus.

20·1. RIGHT. FEMALE, 5 WEEKS.

Twice sectioned through the antrum, mastoid mass, vestibule and internal auditory meatus.

21·1. RIGHT. MALE, 6 WEEKS.

22·1. RIGHT. 6 WEEKS.

23·1. LEFT. MALE, 10 WEEKS.

Anterior meatal wall removed, cochlea opened through the promontory. Vestibule opened from above and behind.

24·1. RIGHT. MALE, 11 WEEKS.

Diploë in the outer antral wall communicating with that of the upper part of the squama. This condition may continue all through life, or the diploë may be invaded by cells. Mastoid mass very dense. For diploë in outer antral wall see Specimens 26·1, 71·1, 126·1, 135·1, 164·1, 254·1, 296·1, 402·1, 403·1, 509·5, 525·1, 581·1.

25·1. RIGHT. 11 WEEKS.

Sectioned twice through the antrum, mastoid mass, semicircular canals and vestibule. Showing well the thin but dense layer of bone which separates the antrum from the diploëtic mastoid mass.

26·1. RIGHT. MALE, 2 MONTHS.

Showing diploë in the outer antral wall.

27·1. RIGHT. FEMALE, 2 MONTHS.

Sectioned through the antrum, mastoid mass and vestibule. A transverse section has also been made at the level of the bottom of the internal auditory meatus to show diploë. Cochlea well shown.

28·1. RIGHT. MALE, 5 MONTHS.

Ossicles in position. The section passes through the descending part of the Fallopian canal.

29·1. LEFT. MALE, 5 MONTHS.

Showing a deep sinus tympani and its relation to the vestibule.

30·1. LEFT. MALE, 5 MONTHS.

The mastoid mass is very dense.

31·1. LEFT. MALE, 5 MONTHS.

Very marked subarcuate fossa nearly reaching the antrum. A canal, evidently for a vessel, passes from the outer extremity of the fossa backwards into the diploë behind and internally to the antrum. A well-marked groove for the petro-squamosal sinus is present with a gap in the suture leading to the antrum.

32·1. LEFT. 5 MONTHS.

Very large cells lining the outer antral wall.

33·1. RIGHT. FEMALE, 6 MONTHS.

Very marked groove for the petro-squamosal sinus running behind into the groove for the lateral sinus; no anterior opening. Sinus tympani well marked with its relationship to the Fallopian canal, the canal for the stapedius, the vestibule and the inferior crus of the posterior semicircular canal. The Fallopian canal has a large knee as it leaves the shelter of the external semicircular canal, and is perforated for vessels. Diploëtic distribution well seen.

34·1. LEFT. FEMALE, 6 MONTHS.

35·1. LEFT. 6 MONTHS.

Large antrum, the outer wall of which has been removed. A curious spur on the posterior border.

36·1. RIGHT. ABOUT 6 MONTHS.

Roof of middle ear and antrum removed. Membrane and ossicles in position. Showing the cells lining the outer antral wall.

37·1. RIGHT. ABOUT 6 MONTHS.

Very large antrum. The section exposes the base of the cochlea.

38·1. RIGHT. ABOUT 6 MONTHS.

Ossicles in position. Arrangement of diploë well seen.

Wherever diploë is present in infancy there may cells replace it, wholly or in part, by extension from some part of the middle-ear tract, later in life forming the cellular types. To study the arrangement of the diploë in early life, see Specimens 27·1, 33·1, 39·1, 44·1, 45·1, 50·1, 53·1, 55·1, 59·1, 63·1, 73·1, 74·1, 92·1, 408·1.

39·1. LEFT. ABOUT 6 MONTHS.

Sectioned twice through the antrum, mastoid mass, vestibule, semicircular canals and internal auditory meatus to show the arrangement of the diploë. Very marked groove for the petro-squamosal sinus.

40·1. LEFT. ABOUT 6 MONTHS.

Opening through the roof of the middle ear to show projection from anterior limb of the tympanic ring, against which lies the neck of the malleus.

41·1. LEFT. ABOUT 6½ MONTHS.

Membrane and ossicles in position. Roof of antrum and middle ear removed.

42·1. RIGHT. MALE, 7 MONTHS.

Showing on the posterior cut surface a large smooth-walled cavity in connection with the descending part of the facial canal quite distinct from the sinus tympani. This cavity is probably the upper end of the first branchial cleft.

43·1. LEFT. FEMALE, 7 MONTHS.

Sectioned vertically through the front of the middle ear. Ossicles in position. The external and internal pyramidal fossæ are well seen in the posterior wall of the middle ear. A spicule of bone passes to the pyramid across each.

44·1. LEFT. 7 MONTHS.

Showing cochlea opened and its relations, especially to the carotid canal. The thin layer of compact bone separating the antrum from the diploëtic mastoid mass is well seen. Twice sectioned to show the arrangement of the diploë.

45·1. RIGHT. ABOUT 7 MONTHS.

Marked groove for the petro-squamosal sinus opening into the sigmoid groove. Deep sinus tympani in relation to vestibule. Twice sectioned to show the arrangement of the diploë.

46·1. RIGHT. MALE, 8 MONTHS.

Light porous bone. Posterior border very thin and projecting.

47·1. RIGHT. FEMALE, 8 MONTHS.

48·1. LEFT. 8 MONTHS.

Light porous bone. Outer antral wall very cellular.

49·1. RIGHT. ABOUT 8 MONTHS.

Cell in connection with the descending part of the Fallopian canal is well seen. Ossicles in position.

50·1. RIGHT. MALE, 9 MONTHS.

Twice sectioned to show the arrangement of the diploë.

51·1. RIGHT. MALE, 9 MONTHS.

Long narrow antrum. Marked groove for the petro-squamosal sinus.

52·1. LEFT. MALE, 9 MONTHS.

Very large antrum. Very little overlapping of squama over mastoid portion of petrous.

53·1. LEFT. FEMALE, 9 MONTHS.

Twice sectioned to show the arrangement of the diploë.

54·1. LEFT. MALE, 10 MONTHS.

Light thin bone. Roof of middle-ear tract removed.

55·1. RIGHT. INFANT.

Sectioned three times to show the arrangement of the diploë and to expose the cell in connection with the descending part of the Fallopian canal.

56·1. RIGHT. INFANT.

Twice sectioned.

57·1. RIGHT. INFANT.

The outer antral wall is composed of a thin outer layer of compact bone and an inner layer of cells. These cells and the apex of the antrum are separated from the mastoid diploë by a thin layer of compact bone.

58·1. LEFT. INFANT.

An additional section through the middle ear, showing anterior and posterior walls. Relation of sinus tympani to the vestibule and posterior semicircular canal. Very large fossa subarcuata, outer extremity divided by crest of bone into superior and inferior fossæ. From the superior a canal, evidently for a vessel, passes to the diploë behind the antrum.

59·1. LEFT. MALE, 11 MONTHS

Diploë passing over and under the loop of the superior semicircular canal and running over the cochlea and internal auditory meatus to join the internal diploëtic mass. The inner antral wall is cellular and separated from the diploë by a thin but distinct layer of compact bone. The cells from the inner antral wall may invade the diploë later in life.

60·1. RIGHT. 1 YEAR.

Showing middle-ear tract with ossicles in position. The labyrinth is opened. Shows the relation of the carotid canal to the Eustachian tube and the cochlea.

61·1. LEFT. MALE, 1 YEAR.

Overlapping squamous portion dense bone. Mastoid mass diploëtic. The bottom of the fossa subarcuata separated from antral cavity by a plate of thin translucent bone. The ridge in the roof of the antrum formed by the free edge of the squamous element is well marked.

62·1. RIGHT. I YEAR AND I MONTH.

Sectioned through the antrum and mastoid mass only.

63·1. RIGHT. I YEAR AND I MONTH.

Tympanic plate completely closed. Twice sectioned to show arrangement of diploë.

64·1. RIGHT. I YEAR AND 2 MONTHS.

The outer antral wall is becoming thick and dense.

65·1. LEFT. I YEAR AND 2 MONTHS.

Well-marked dense bony partition between the antrum and diploëtic mastoid mass. This bone would probably have remained of the diploëtic type and devoid of mastoid cells all through life forming the diploëtic infantile type.

66·1. LEFT. MALE, I YEAR AND 4 MONTHS.

Some dipping down of middle fossa over the roof of the antrum. No mastoid cells.

67·1. LEFT. FEMALE, I YEAR AND 5 MONTHS.

Twice sectioned; the thin but dense bony partition between the antrum and diploëtic mastoid mass is well seen.

68·1. RIGHT. MALE, I YEAR AND 7 MONTHS.

Commencing formation of mastoid cells. The diploëtic mastoid is being invaded from the antrum along the petro-mastoid suture.

69·1. LEFT. MALE, 1 YEAR AND 8 MONTHS.

Very well-marked groove, partly bridged over for the petro-squamosal sinus, running backwards to the lateral sinus and forwards to the base of the zygoma.

70·1. LEFT. FEMALE, 1 YEAR AND 8 MONTHS.

Large antrum. Very little overlapping of squama over mastoid portion of petrous.

71·1. RIGHT. MALE, 1 YEAR AND 9 MONTHS.

A thin layer of diploë is present in the outer antral wall between the outer compact and inner cellular layers.

72·1. LEFT. FEMALE, 1 YEAR AND 9 MONTHS.

Diploëtic mastoid mass scraped away, leaving dense separating bony partition. Descending part of the facial canal with a large elbow exposed, showing its relation to the sinus tympani—the relation of the sinus tympani to the vestibule and to the posterior semicircular canal is also shown.

73·1. LEFT. MALE, 1 YEAR AND 10 MONTHS.

Very small antrum, the posterior wall far away from the posterior fossa. Mastoid densely diploëtic, joining internal diploë below bony labyrinth ; line of junction well marked at the level of inner wall of vestibule and corresponding to the projection into roof of jugular foramen. Marked difference in the two masses of diploë.

74·1. RIGHT. FEMALE, 1 YEAR AND 10 MONTHS.

Twice sectioned. Large and deep petro-squamosal groove ; opening behind into lateral sinus groove after passing under a bridge. The front opening is closed by thin bone. Large communication from antrum to the sinus groove for vein. Diploë passing from floor of middle ear under the cochlea to join internal diploëtic mass.

75·1. LEFT. FEMALE, 1 YEAR AND 10 MONTHS.

Small light bone. Large antrum. The apex of the antrum pushes well into the mastoid diploë.

76·1. LEFT. 1 YEAR AND 10 MONTHS.

Outer antral wall removed.

77·1. LEFT. FEMALE, 1 YEAR AND 11 MONTHS.

Outer antral wall is thicker and composed of dense bone. The mastoid mass densely diploëtic. A deep sinus tympani. Relations of cochlea well seen.

78·1. RIGHT. MALE, 2 YEARS.

Large mass of cells lining the thin outer antral wall; are beginning to invade the mastoid diploë.

79·1. RIGHT. MALE, 2 YEARS.

Very large antrum with extension of cells into the mastoid diploë.

80·1. LEFT. MALE, 2 YEARS.

Twice sectioned. Well-marked "petrous cell" with foramina in it, and with the facial nerve running through it. A wire is passed through the course of the facial nerve.

81·1. LEFT. MALE, 2 YEARS.

Large high-lying antrum. Cells from the antrum are invading the mastoid diploë.

82·1. LEFT. MALE, 2 YEARS.

Twice sectioned, showing the relations of the vestibule. Mastoid mass densely diploëtic.

83·1. LEFT. MALE, 2 YEARS.

Mastoid cells well developed. No mastoid diploë whatever remaining.

84·1. RIGHT. FEMALE, 2 YEARS.

"Petrous cell" outlined in ink. The facial nerve in its descending part lies just in front of it. A foramen runs from it to the inferior surface. The stapedial canal abuts on to it, and is apparently connected with it. The sulcus jugularis lies against its inner wall. The sinus tympani dips down and abuts on to it. Nearly all the mastoid diploë has been invaded by cells.

85·1. RIGHT. FEMALE, 2 YEARS AND 1 MONTH.

Well-marked "petrous cell." Facial nerve runs through it. Large antrum. Very little overlapping of squamous over mastoid portion of petrous.

86·1. RIGHT. FEMALE, 2 YEARS AND 1 MONTH.

"Petrous cell" below and behind descending part of facial nerve. No sign of invasion of the mastoid diploë by cells.

87·1. LEFT. MALE, 2 YEARS AND 6 MONTHS.

Cells invading the mastoid diploë from the antrum. Relations of the labyrinth are well seen.

88·1. LEFT. FEMALE, 2 YEARS AND 6 MONTHS.

Cells from the antrum are beginning to invade the mastoid diploë.

89·1. LEFT FEMALE, 2 YEARS AND 7 MONTHS.

Mastoid mass densely diploëtic. The outer compact layer of the outer antral wall is becoming thicker. Section well shows relation of vestibule to internal auditory meatus.

90·1. RIGHT. 2 YEARS AND 11 MONTHS.

Twice sectioned. The descending part of the lateral sinus is becoming more upright. "Petrous cell" outlined in ink.

91·1. RIGHT. MALE, 3 YEARS.

Mastoid mass densely diploëtic.

92·1. LEFT. FEMALE, 3 YEARS.

Twice sectioned, showing arrangement of the diploë. No sign of invasion of the mastoid diploë by cells.

93·1. LEFT. FEMALE, 3 YEARS.

The outer wall of the antrum is becoming dense and thick, a thin layer of cells lying along the squamo-mastoid junction and coming to the surface below the dense outer antral wall.

94·1. RIGHT. 3 YEARS.

Very large and forward lateral sinus. Mastoid vein very far back. Canal in bone $\frac{3}{5}$ in. in length.

95·1. RIGHT. 3 YEARS.

Roof of attic removed; ossicles in position. Vertical section through antrum and mastoid mass. Cells from antrum commencing to invade mastoid diploë.

96·1. RIGHT. 3 YEARS

Showing the attic and its relations from the front; also the relation of the cochlea to the middle ear.

The posterior half of the membrane and the ossicles are in position. The mastoid mass is densely diploëtic.

97·1. RIGHT. MALE, 3½ YEARS.

Cellular throughout, with rim of diploë at the tip. Cells extending over superior semicircular canal, Large cell in outer antral wall extending upwards into the squama and shut off from the antrum by a thin partition.

98·1. LEFT. 3½ YEARS.

Middle-ear tract, vestibule and cochlea and internal auditory meatus opened from above. Membrane and ossicles in position.

99·1. LEFT. 3½ YEARS.

Middle-ear tract and labyrinth opened from above. Membrane removed. Ossicles in position.

100·1. LEFT. 3½ YEARS.

Middle-ear tract and labyrinth opened from above. Membrane and ossicles and anterior meatal wall removed.

101·1. RIGHT. 4 YEARS.

Roof of middle-ear tract removed. Ossicles in position.

102·1. LEFT. MALE, 4 YEARS.

Large antrum. Cells from the antrum beginning to invade the mastoid diploë.

103·1. LEFT. FEMALE, 4 YEARS.

Outer antral wall dense and thick. No sign of mastoid cells. High jugular bulb.

104·1. LEFT. ABOUT 4 YEARS.

A perforation has been made through the outer antral wall. The mastoid mass is diploëtic, and the layer of compact bone between it and the antrum is very marked.

105·1. RIGHT. 4½ YEARS.

Densely diploëtic mastoid. Small antrum.

106·1. RIGHT. MALE, 5 YEARS.

Cells from antrum invading the mastoid diploë. Relations of a large sinus tympani well seen, especially to vestibule and posterior semicircular canal.

107·1. RIGHT. FEMALE, 5 YEARS.

No sign of mastoid cells.

108·1. LEFT. 5½ YEARS.

Outer wall of antrum removed. Middle ear exposed, showing relation of facial nerve to the radical operation. Also of cochlea to the carotid canal. "Bridge" remaining between antrum and meatus.

109·1. RIGHT. MALE, 6 YEARS.

Cells from antrum invading the mastoid diploë.

110·1. RIGHT. MALE, 6 YEARS.

Mastoid cells well developed. No diploë remaining in the mastoid process.

111·1. RIGHT. MALE, 6 YEARS.

Diploëtic infantile type. The dense squamous part is sharply marked off from diploëtic mastoid portion. This bone would have remained devoid of mastoid cells through life. The outer wall of the antrum is dense externally and lined internally by the cells which form in fœtal life.

112·1. RIGHT. FEMALE, 6 YEARS.

Diploëtic infantile type. No mastoid cells. Small antrum, the outer wall of which retains the infantile condition but the outer compact layer is thicker.

113·1. LEFT. FEMALE, 6 YEARS.

Cells from the antrum are invading the mastoid diploë.

114·1. LEFT. FEMALE, 6 YEARS.

Cells from the antrum are invading the mastoid diploë.

115·1. LEFT. FEMALE, 6 YEARS.

Cells from antrum invading the mastoid diploë. The middle fossa dips down, causing a sloping roof to the antrum.

116·1. LEFT. FEMALE, 6 YEARS.

Outer antral wall removed. Large antrum with thin translucent posterior wall against which lies the cerebellum and lateral sinus. Cells from antrum invading mastoid diploë.

117·1. RIGHT. MALE, 7 YEARS.

Cells from antrum invading upper mastoid diploë and extending up into squama.

118·1. RIGHT. MALE, 7 YEARS.

Diploëtic infantile type. Outer antral wall dense with an inner layer of fine cells. Mastoid mass diploëtic. Thin but dense layer of bone separating the cavity of the antrum from the mastoid diploë.

119·1. LEFT. MALE, 7 YEARS.

Cells invading the mastoid diploë.

120·1. LEFT. MALE, 7 YEARS.

Diploëtic infantile type. A very forward lateral sinus reaching posterior meatal wall below the antrum.

121·1. RIGHT. FEMALE, 7 YEARS.

Very large antrum with extension to tip of mastoid. Projection upwards into middle fossa at the line of the junction of the inner edge of squama with tegmen, externally and parallel to the elevation caused by the superior semicircular canal. Antrum extends high up. Lateral sinus far back.

122·1. RIGHT. FEMALE, 7 YEARS.

Twice sectioned. Cells have invaded the mastoid diploë, except at the extreme tip.

123·1. RIGHT. FEMALE, 7 YEARS.

Diploëtic infantile type. Marked groove for the petro-squamosal sinus. Forward lateral sinus.

124·1. RIGHT. FEMALE, 8 YEARS.

Cells throughout mastoid. Large antrum. Thin postero-internal antral wall to cerebellum and lateral sinus.

125·1. LEFT. FEMALE, 8 YEARS.

Mastoid finely cellular all through with dense cortex.

126·1. RIGHT. MALE, 9 YEARS.

Twice sectioned. Small antrum. Diploë extending up into squama and lying between the outer compact layer and the inner cellular layer of the outer antral wall. Diploëtic mastoid. This condition may continue all through life. Forward lateral sinus.

127·1. RIGHT. 9 YEARS.

Outer antral wall dense. Cells in upper mastoid.

Tip of process diploëtic. Forward lateral sinus. Descending part of facial canal seen from behind.

128·1. LEFT. FEMALE, 9 YEARS.

Outer antral wall dense. Cells invading the mastoid diploë. This specimen well shows that the meatal tubercle is on the same level as the apex of the opening from the attic to the antrum.

129·1. LEFT. FEMALE, 9 YEARS.

Cellular throughout the outer antral wall and mastoid. The cells extend upwards into the squama, forwards over the meatus into the zygoma, and inwards under the loop of the superior semicircular canal and behind the descending part of the facial nerve under the semicircular canals reaching the sulcus jugularis.

130·1. RIGHT. 10 YEARS.

Mastoid cellular throughout. Forward lateral sinus.

131·1. LEFT. MALE, 10 YEARS.

From a case of hydrocephalus. Light thin bone. The middle fossa external to the middle-ear tract dips down and also bulges the squama. Macewen's triangle leads to dura mater. Outer antral wall dense. Cells from the apex of the antrum have invaded the mastoid diploë, but leaving the tip of the process diploëtic.

132·1. LEFT. 10 YEARS.

Diploëtic infantile type, showing middle-ear tract from above. Vestibule opened. Cochlea exposed. Relation of cochlea to internal auditory meatus, canal for the tensor tympani, the Eustachian tube, and the internal carotid artery. Membrane and ossicles in position.

133·1. RIGHT. MALE, 11 YEARS.

Dense outer antral wall; a narrow tract of cells in dense upper mastoid; lower mastoid diploëtic.

134·1. RIGHT. 11 YEARS.

Diploëtic infantile type. The outer antral wall is dense externally, with the layer of fœtal cells internally. A thin but dense layer of bone separates the floor of the antrum from the diploëtic mastoid process. The ossicles are in position. Very forward lateral sinus.

135·1. LEFT. MALE, 11 YEARS.

The outer antral wall is composed of four layers—a thin outer layer of compact bone, a thin layer of diploë formed by the zygomatic and squamous elements, a thick layer of compact bone, and the inner layer of fœtal cells. Cells from the apex of the antrum have invaded the upper mastoid diploë. The projection of the upper end of the styloid process into the floor of the middle ear just below the pyramid is well seen. The sulcus jugularis is large and high-lying.

136·1. LEFT. MALE, 11½ YEARS.

Diploëtic infantile type. Forward lateral sinus.

137·1. RIGHT. FEMALE, 11½ YEARS.

Diploëtic infantile type. Forward lateral sinus below the antrum.

138·1. LEFT. FEMALE, 13 YEARS.

Diploëtic infantile type. Forward lateral sinus. The anterior meatal wall, membrane and ossicles have been removed.

139·1. RIGHT. MALE, 14 YEARS.

Outer antral wall dense. Mastoid cellular except for the tip, which is diploëtic.

140·1. RIGHT. 14 YEARS.

Diploëtic infantile type. Very little chance of infection spreading to the posterior fossa.

141·1. LEFT. MALE, 15 YEARS.

Outer antral wall dense. Fine cells in the upper mastoid. Lower mastoid diploëtic. From the floor of the middle ear cells extend inwards under the vestibule and internal auditory meatus and over the sulcus jugularis, and reach the internal mass of diploë.

142·1. RIGHT. MALE, 16 YEARS.

Mastoid cellular throughout, except for slight diploë at extreme tip. Small high-lying antrum.

143·1. RIGHT. FEMALE, 16 YEARS.

Cellular bone. A rim of diploë at the tip of the mastoid process. The cells run inwards, reaching the high-lying sulcus jugularis. A large forward sinus. Large mastoid vein starting single and emerging double.

144·1. RIGHT. FEMALE, 16 YEARS.

Cellular throughout, some diploë remaining at extreme tip of mastoid. A large cell in the base of the zygoma communicating with cells in outer antral wall. Lateral sinus lies far back.

145·1. RIGHT. FEMALE, 16 YEARS.

Diploëtic infantile type. Forward lateral sinus with a transverse ledge at the knee.

146·1. RIGHT. FEMALE, 16 YEARS.

Diploëtic infantile type. Middle fossa loops down, depressing roof of antrum. Macewen's triangle leads to dura mater.

147·1. RIGHT. 16 YEARS.

Cellular throughout. Inferior cells large. Membrane and ossicles in position.

148·1. RIGHT. MALE, 17 YEARS.

Outer antral wall and upper mastoid cellular. Lower mastoid diploëtic. The line of invading cells well marked. High-lying antrum. Large and forward lateral sinus.

149·1. RIGHT. MALE, 17 YEARS.

Outer antral wall and upper mastoid cellular; tip diploëtic. The fœtal cells clearly marked off from the coarse later-formed cells in the outer antral wall.

150·1. LEFT. FEMALE, 17 YEARS.

Outer antral wall and entire mastoid cellular. Cells in base of zygoma communicating with cells in outer antral wall.

151·1. RIGHT. MALE, 18 YEARS.

Outer antral wall and entire mastoid cellular. The lower cells are large and marked off from the finer upper cells, which pass under the vestibule and partly over the jugular bulb. The lower cells pass over the digastric fossa, forming a bulla. High-lying antrum.

152·1. RIGHT. MALE, 18 YEARS.

Outer antral wall dense. Mastoid cells reach nearly to tip, which is diploëtic.

153·1. RIGHT. 18 YEARS.

Outer antral wall dense. A track of cells runs through upper part of mastoid to a large cell, the outer wall of which has been removed, in the lower mastoid. The inferior wall of the cell to occipital and digastric fossæ very thin where pus could easily penetrate, forming one variety of "Bezold's perforation."

154·1. LEFT. MALE, 18 YEARS.

Outer antral wall and mastoid cellular, thin rim of diploë remaining at outer surface of tip. Cells pass over and under the labyrinth and internal auditory meatus, and entirely replace the internal diploë. A rare specimen.

155·1. RIGHT. MALE, 19 YEARS.

Diploëtic infantile type. Outer antral wall ¾ in. in thickness. Canal in antrum, just above external semicircular canal, leads to groove for superior petrosal sinus. Large and forward lateral sinus.

156·1. RIGHT. FEMALE, 19 YEARS.

Outer antral wall dense. Upper mastoid cells extend downwards and inwards to digastric fossa. Tip of mastoid dense.

157·1. RIGHT. 19 YEARS.

Outer antral wall and upper mastoid cellular; lower mastoid diploëtic.

158·1. LEFT. 19 YEARS.

Diploëtic infantile type. Lateral sinus is not forward. Elevation on the superior surface caused by the superior semicircular canal very marked. Small antrum.

159·1. RIGHT. MALE, 20 YEARS.

Outer antral wall and upper mastoid cellular; lower mastoid diploëtic. Forward sinus encroaching on Macewen's triangle. Roughly circular translucent partition between sinus and surface immediately behind antrum. Very large and deep sinus tympani running well behind the facial nerve. Canal for vessel through floor of middle ear to jugular bulb.

160·1. LEFT. MALE, 20 YEARS.

Cellular throughout. Remains of masto-squamosal suture very marked.

161·1. LEFT. FEMALE, 20 YEARS.

Outer antral wall dense. A narrow track of cells from antrum to a group of larger cells in the upper mastoid. Lower mastoid diploëtic. Middle fossa dips down behind and externally to the antrum. Forward lateral sinus.

162·1. RIGHT. MALE, 21 YEARS.

Outer antral wall and upper mastoid coarsely cellular. Lower mastoid diploëtic. Cells from roof and floor of middle ear running inwards over carotid canal and reaching the internal diploë.

163·1. RIGHT. MALE, 21 YEARS.

Diploëtic infantile type. Postero-internal antral wall is translucent to the posterior fossa—a specially dangerous thing, if the antrum becomes infected, in this type of bone. Forward sinus. High sulcus jugularis.

164·1. LEFT. MALE, 21 YEARS.

Diploëtic infantile type. The diploë runs up through the outer antral wall. Large antrum ; the lower part of its postero-internal wall is translucent to the lateral sinus, which is well forward.

165·1. LEFT. MALE, 21 YEARS.

Cellular throughout except for rim of diploë at tip of mastoid. The cells, which have invaded the zygomatic element, are marked off from the lower squamous and mastoid cells by a distinct bar of dense bone (marked in ink). Cells invading occipital diploë. High antrum.

166·1. RIGHT. FEMALE, 21 YEARS.

Cellular throughout. Antrum somewhat high-lying.

167·1. RIGHT. MALE, 22 YEARS.

Diploëtic infantile type. The lateral sinus is small and not forward.

168·1. RIGHT. MALE, 22 YEARS.

Diploëtic infantile type. Forward lateral sinus. The middle fossa dips down, causing a sloping antral roof.

169·1. RIGHT. FEMALE, 22 YEARS.

Cellular throughout.

170·1. RIGHT. MALE, 23 YEARS.

Cellular throughout except for thin rim of diploë at the tip of mastoid. Cells run inwards to high-lying jugular bulb.

171·1. RIGHT. 23 YEARS.

Outer antral wall dense. Upper mastoid cellular; lower diploëtic.

172·1. RIGHT. FEMALE, 23 YEARS.

Outer antral wall dense. Upper mastoid cellular; tip diploëtic. The developmental opening in the tympanic plate is still widely open.

173·1. LEFT. FEMALE, 23 YEARS.

Outer antral wall dense. Mastoid cellular throughout. Very marked outward projection of mastoid process.

174·1. RIGHT. MALE, 24 YEARS.

Diploëtic infantile type. Postero-internal antral wall translucent to the posterior fossa. Forward lateral sinus.

175·1. RIGHT. MALE, 24 YEARS.

Diploëtic infantile type. Forward lateral sinus.

176·1. LEFT. MALE, 24 YEARS.

Outer antral wall dense ; a few cells in the upper mastoid. Lower mastoid is diploëtic.

177·1. RIGHT. FEMALE, 24 YEARS.

Outer antral wall dense. Cells in upper mastoid ; tip diploëtic.

178·1. RIGHT. FEMALE, 24 YEARS.

Cellular throughout with exception of tip of mastoid which is diploëtic. Stalagmitic cells in floor of middle ear passing under the cochlea. Very small lateral sinus.

179·1. RIGHT. MALE, 25 YEARS.

Cellular throughout. Outer antral cells extending over the meatus.

180·1. RIGHT. MALE, 25 YEARS.

Outer antral wall dense. Upper mastoid slightly cellular. Lower mastoid diploëtic. High-lying antrum. Spine close to temporal line.

181·1. RIGHT. 25 YEARS.

Cellular throughout. Thin rim of diploë at tip of mastoid.

182·1. RIGHT. MALE, 26 YEARS.

Diploëtic infantile type. The lateral sinus is small and not forward.

183·1. LEFT. MALE, 26 YEARS.

Outer antral wall dense. A few cells in upper mastoid. Lower mastoid diploëtic. Forward lateral sinus.

184·1. RIGHT. FEMALE, 26 YEARS.

Diploëtic infantile type. Postero-internal antral wall which is pushed forward is translucent to cerebellum. Forward lateral sinus.

185·1. LEFT. FEMALE, 26 YEARS.

Cellular throughout; the cells extending over and under a forward lateral sinus.

186·1. RIGHT. 26 YEARS.

Outer antral wall and mastoid cellular. Tip of mastoid densely diploëtic.

187·1. LEFT. 26 YEARS.

Outer antral wall dense. Mastoid cellular; tip diploëtic.

188·1. RIGHT. MALE, 27 YEARS.

Outer antral wall dense. Mastoid cellular. High sulcus jugularis with facial nerve in its descending part close to it.

189·1. RIGHT. MALE, 27 YEARS

Outer antral wall and entire mastoid cellular; extreme tip diploëtic. The cells run inwards over a low-lying sulcus jugularis and under the vestibule and internal auditory meatus. Sinus tympani and external pyramidal fossa seen from behind with facial canal between. The opening of the sinus tympani is crossed by a bar of bone leaving a small hole below.

190·1. LEFT. MALE, 27 YEARS.

Diploëtic infantile type. A small but very forward lateral sinus reaches the posterior meatal wall where the bone is translucent. High-lying antrum; but the middle fossa dips down causing a sloping roof to the cavity. Lower part of Macewen's triangle leads to the lateral sinus.

191·1. RIGHT. FEMALE, 27 YEARS.

Outer antral wall dense. Cellular mastoid with a diploëtic tip. Forward lateral sinus. Mastoid process projects markedly outwards. The descending part of the Fallopian canal has an outward dilatation just before it reaches the stylo-mastoid foramen.

192·1. RIGHT. MALE, 28 YEARS.

Cellular throughout. Large, high-lying antrum.

193·1. RIGHT. FEMALE, 28 YEARS.

Diploëtic type with a smooth-walled cell below and internally to the apex of the antrum. Great depression of middle fossa behind antrum.

194·1. RIGHT. FEMALE, 28 YEARS.

Cellular throughout. Postero-internal antral wall translucent to cerebellum and lateral sinus.

195·1. LEFT. FEMALE, 28 YEARS.

Cellular throughout, cells extending backwards over the lateral sinus and forwards over the meatus. High-lying antrum.

196·1. LEFT. MALE, 29 YEARS.

Outer antral wall dense. Some cells in upper mastoid along squamo-mastoid suture; remainder of mastoid diploëtic.

197·1. RIGHT. MALE, 29 YEARS.

Outer antral wall dense. Cells in upper mastoid; lower mastoid diploëtic. Large high-lying antrum.

198·1. RIGHT. MALE, 29 YEARS.

A few small cells in dense outer antral wall and upper mastoid; lower mastoid diploëtic. High-lying antrum. Forward lateral sinus.

199·1. RIGHT. 29 YEARS.

Diploëtic infantile type. Forward lateral sinus.

200·1. LEFT. FEMALE, 29 YEARS.

Diploëtic infantile type. Forward lateral sinus below antrum.

201·1. LEFT. FEMALE, 29 YEARS.

Diploëtic infantile type. Overlapping squamous portion of mastoid process very dense and sharply marked off.

202·1. RIGHT. MALE, 30 YEARS.

Cellular throughout, cells running under vestibule and over sulcus jugularis. Lateral sinus very far back.

203·1. RIGHT. MALE, 30 YEARS.

Diploëtic infantile type. Small antrum.

204·1. RIGHT MALE, 30 YEARS.

Diploëtic type. The diploë is very dense. The antrum is small. The lateral sinus is well forward. The mastoid emissary vein is double.

205·1. LEFT. MALE, 30 YEARS.

Outer antral wall and upper mastoid cellular. A specially large cell in outer antral wall. Lower mastoid diploëtic. Middle fossa dips down externally to the superior semicircular canal.

206·1. LEFT. MALE, 30 YEARS.

Cellular throughout.

207·1. RIGHT FEMALE, 30 YEARS.

Finely cellular throughout except for slight diploë at tip. The postero-internal antral wall is in relation to the cerebellum and lateral sinus.

208·1. LEFT. MALE, 31 YEARS.

Cellular throughout except for a rim of diploë at extreme tip; the cells run inwards to a high outpushing sulcus jugularis. A curious plate of bone springing from the vaginal process.

209·1. LEFT. 31 YEARS.

Outer antral wall dense. Mastoid cellular throughout.

210·1. RIGHT. MALE, 32 YEARS.

Finely cellular throughout. The cortex of the mastoid is dense.

211·1. RIGHT. MALE, 32 YEARS.

Diploëtic infantile type Forward lateral sinus. Not a fracture.

212·1. RIGHT. MALE, 32 YEARS.

Outer antral wall dense. Some cells in upper mastoid running downwards and inwards; lower mastoid diploëtic. Forward lateral sinus. Small high-lying antrum. Gaps in the groove of the lateral sinus to the mastoid cells. (Not pathological.)

213·1. RIGHT. MALE, 32 YEARS.

Cellular throughout. Large, long, high-lying antrum.

214·1. LEFT. MALE, 32 YEARS.

Outer antral wall and mastoid cellular. Tip of mastoid diploëtic.

215·1. RIGHT. FEMALE, 32 YEARS.

Outer antral wall dense. Some cells in upper mastoid; lower mastoid diploëtic. High-lying antrum. Forward lateral sinus, especially at the knee.

216·1. RIGHT MALE, 33 YEARS.

A large cell in outer antral wall with cells in upper mastoid running downwards and inwards; lower mastoid diploëtic. Dipping down of middle fossa externally to antrum. The zygomatic line bulges outwards. Upper part of Macewen's triangle leads to dura mater.

217·1. RIGHT. MALE, 33 YEARS.

Cellular throughout. Large antrum. The postero-internal wall is devoid of cells, and has the cerebellum and lateral sinus lying against it.

218·1. RIGHT. MALE, 33 YEARS.

Diploëtic infantile type. The antrum is small, and lies wholly above the posterior zygomatic line. The lateral sinus is well forward below the level of the antrum.

219·1. LEFT. MALE, 33 YEARS.

Outer antral wall dense. Cells in upper mastoid running downwards and inwards. Large long antrum lying partly above posterior zygomatic line. High outpushing sulcus jugularis.

220·1. RIGHT. FEMALE, 33 YEARS.

Cellular throughout. Middle fossa dips down behind antrum.

221·1. RIGHT. 33 YEARS.

Outer antral wall dense. Mastoid cellular; tip diploëtic.

222·1. RIGHT MALE, 34 YEARS.

Variously sectioned. Outer antral wall dense. A narrow track of cells in upper mastoid, leading to huge cells in lower mastoid running backwards over the lateral sinus.

223·1. LEFT. MALE, 34 YEARS.

Outer antral wall and upper mastoid cellular. Lower mastoid diploëtic. High-lying antrum.

224·1. LEFT. FEMALE, 34 YEARS.

Outer antral wall dense. Upper mastoid cellular. Lower mastoid diploëtic. Marked grooving for the petro-squamosal sinus, which passes under a bridge in its posterior half inch to open into the lateral sinus groove.

225·1. LEFT. FEMALE, 34 YEARS.

Outer antral wall and entire mastoid cellular. The cells run inwards over the digastric and occipital grooves.

226·1. RIGHT. MALE, 35 YEARS.

Outer antral wall dense. A few cells running inwards from antrum; remainder of mastoid diploëtic. Marked grooving for the petro-squamosal sinus, passing under a bridge behind to open into a lateral sinus groove; in front running upwards and backwards to open on surface above base of zygoma.

227·1. LEFT. FEMALE, 35 YEARS.

Outer antral wall and entire mastoid cellular. Cells running inwards to the jugular bulb and occipital bone. A large cell behind and externally to the antrum in relation to the middle fossa and lateral sinus groove. Cells extend into the base of the zygoma.

228·1. RIGHT. MALE, 36 YEARS.

To illustrate the opening of the antrum through Macewen's triangle. Outer antral wall dense. Some cells in upper mastoid running downwards and inwards; remainder diploëtic. Cells from floor of middle ear lying under the labyrinth and over sulcus jugularis.

229·1. RIGHT. MALE, 36 YEARS.

Outer antral wall dense. Upper mastoid cellular, lower diploëtic. Very thin roof to the meatus. Hydrocephalic bone. Posterior zygomatic line bulges outwards. Operation through Macewen's triangle would lead to dura mater. High out-pushing sulcus jugularis with a large gap in posterior fossa below aqueductus vestibuli. Posterior canal open into sulcus. Groove for petro-squamosal sinus.

230·1. LEFT. MALE, 36 YEARS.

Outer antral wall dense. Cells in upper mastoid running backwards and downwards over the lateral sinus groove. Lower mastoid diploëtic.

231·1. LEFT. FEMALE, 36 YEARS.

Cellular throughout except for some diploë at tip of process. A huge cell in lower mastoid. Cells invading occipital diploë. The antrum lies very high. The fine cells seen in the outer antral wall in fœtal life well marked off from the coarser later formed cells.

232·1. LEFT. MALE, 37 YEARS.

Irregular depression on outer aspect behind the spine. A few cells in outer antral wall and upper mastoid. Lower mastoid densely diploëtic.

233·1. LEFT. 37 YEARS.

Cellular throughout.

234·1. RIGHT. MALE, 38 YEARS.

Cellular throughout. A large cell in tip of mastoid which is very thin internally where pus could easily perforate, forming one variety of "Bezold's perforation."

235·1. LEFT. MALE, 38 YEARS.

Cells in outer antral wall and upper mastoid. Lower mastoid diploëtic. The "fœtal cells" in the outer antral wall are clearly marked off from the later-formed cells. High-lying antrum. Forward lateral sinus below antrum.

236·1. LEFT. MALE, 38 YEARS.

Outer antral wall partly cellular and partly dense. Mastoid cells very large and running over digastric fossa. The antrum is small and high but the middle fossa dips down externally to it.

237·1. RIGHT. MALE, 39 YEARS.

Outer antral wall dense. A few cells in upper mastoid. Lower mastoid diploëtic. High-lying antrum.

238·1. LEFT. MALE, 39 YEARS.

Outer antral wall dense. Cells in upper mastoid. Lower mastoid diploëtic.

239·1. LEFT. MALE, 39 YEARS.

Twice sectioned. Outer antral wall dense with a cell in squama above and behind. Mastoid cellular throughout except for slight rim of diploë at the tip. Sulcus jugularis very thin where it forms the floor of the middle ear.

240·1. RIGHT. MALE, 40 YEARS.

Outer antral wall dense. Mastoid cellular throughout; the cells run downwards and inwards up to and below the sulcus jugularis and are invading the diploë of the occipital. High-lying antrum.

241·1. RIGHT. MALE, 40 YEARS.

Outer antral wall dense. Upper mastoid cellular. Lower mastoid mostly diploëtic. Two cells come to the surface at the top of the inner aspect of the mastoid process.

242·1. LEFT. MALE, 40 YEARS.

Cellular throughout, except for tip of process, which is diploëtic. Line of demarcation between squamous and mastoid elements very marked. Cells extending above and behind the antrum. Cells from inner antral wall passing under the curve of the superior semicircular canal.

243·1. LEFT. MALE, 40 YEARS.

Cellular throughout except for rim of diploë at tip of mastoid process.

244·1. RIGHT. FEMALE, 40 YEARS.

Twice sectioned. Diploëtic infantile type. Forward lateral sinus.

245·1. RIGHT. FEMALE, 40 YEARS.

Outer antral wall dense. A few cells in upper mastoid along squamo-mastoid junction. Lower mastoid diploëtic. Forward lateral sinus.

246·1. RIGHT. 40 YEARS.

Finely cellular throughout.

247·1. RIGHT. 40 YEARS.

Finely cellular throughout. Forward lateral sinus.

248·1. LEFT. 40 YEARS.

Diploëtic infantile type.

249·1. RIGHT. MALE, 41 YEARS.

A few cells in outer antral wall. Upper mastoid cellular; lower mastoid diploëtic. Very projecting posterior zygomatic line. High-lying antrum.

250·1. RIGHT. MALE, 41 YEARS.

Outer antral wall dense. Mastoid cellular except for tip, which is diploëtic. Forward lateral sinus.

251·1. RIGHT. MALE, 41 YEARS.

Outer antral wall and upper mastoid cellular. Tip dense.

252·1. RIGHT. MALE, 41 YEARS.

Cellular throughout. Large high-lying antrum. Very large and forward lateral sinus.

253·1. LEFT. MALE, 41 YEARS.

Outer antral wall dense. A few cells in upper mastoid; lower mastoid diploëtic.

254·1. LEFT. MALE, 41 YEARS.

Diploëtic infantile type. Thin layer of diploë extending through outer antral wall. Small antrum.

255·1. RIGHT. FEMALE, 41 YEARS.

Outer antral wall and upper mastoid cellular. Lower mastoid diploëtic. Large long antrum. Large mastoid vein canal.

256·1. RIGHT. FEMALE, 41 YEARS.

Outer antral wall dense. Mastoid cellular except for the tip, which is diploëtic

257·1. LEFT. FEMALE, 41 YEARS

Outer antral wall and upper mastoid cellular. Lower mastoid diploëtic.

258·1. RIGHT. MALE, 42 YEARS.

A large cell in outer antral wall, with a series of large cells running downwards and inwards to the digastric fossa and invading the occipital bone. Mastoid process diploëtic. Dipping down of middle fossa. High posterior zygomatic line. Macewen's triangle leads to dura mater. Light thin bone. In a bone of this type pus may reach the neck without involving the mastoid process.

259·1. RIGHT. MALE, 42 YEARS.

Diploëtic infantile type. The antrum lies almost entirely above the posterior zygomatic line. The lateral sinus is well forward.

260·1. RIGHT. MALE, 42 YEARS.

Outer antral wall and upper mastoid cellular, sharply marked off from diploëtic lower mastoid. A series of large cells above and behind antrum. High-lying antrum.

261·1. RIGHT. MALE, 42 YEARS.

Cellular throughout. Tip of process diploëtic.

262·1. LEFT. MALE, 42 YEARS.

Outer antral wall dense. A few cells in upper mastoid ; lower mastoid diploëtic.

263·1. LEFT. MALE, 42 YEARS.

Outer antral wall and mastoid cellular. Tip of process diploëtic. Long large antrum, which is partly above the posterior zygomatic line.

264·1. RIGHT. FEMALE, 42 YEARS.

Cellular throughout ; the fine antral cells well marked off from outer coarser cells. Large antrum, partly above Macewen's triangle. Lateral sinus very far back. A cavity in lower part of outer aspect of vaginal process

265·1. LEFT. FEMALE, 42 YEARS.

Cellular throughout except for extreme tip of mastoid, which is densely diploëtic. Middle fossa dips down, causing a low, flat antrum. Macewen's triangle leads to dura mater. Sinus tympani divided into two pockets by thin perforated shelf of bone.

266·1. LEFT. FEMALE, 42 YEARS.

Outer antral wall dense. Large cells in mastoid. Slight diploë at extreme tip.

267·1. RIGHT. MALE, 43 YEARS.

Outer antral wall and upper mastoid cellular. Tip diploëtic. Large narrow sinus tympani. Cells from the floor of the middle ear passing inwards under the vestibule and internal auditory meatus and over the sulcus jugularis, reaching the internal diploëtic mass.

268·1. RIGHT. MALE, 43 YEARS.

Outer antral wall and upper mastoid cellular; lower mastoid diploëtic. Cells from the floor of the middle ear passing inwards under the vestibule and internal auditory meatus and over the sulcus jugularis.

269·1. RIGHT. 43 YEARS.

Outer antral wall dense. Upper mastoid cellular; lower mastoid diploëtic at its tip. High-lying antrum. A very large sinus tympani; the dividing wall between it and the vestibule is translucent; its posterior wall is translucent to the posterior fossa just below the aqueductus vestibuli. Projection into roof of antrum of the free edge of the squama at petro-squamosal suture very marked.

270·1. RIGHT. MALE, 44 YEARS.

Diploëtic infantile type. High-lying antrum. Forward lateral sinus. Well-marked external pyramidal fossa.

271·1. RIGHT MALE, 44 YEARS.

Diploëtic infantile type. High-lying antrum. Forward lateral sinus.

272·1. RIGHT. MALE, 44 YEARS.

Outer antral wall dense. Upper mastoid slightly cellular. Lower mastoid diploëtic. Small high-lying antrum. Well-marked external and internal pyramidal fossæ.

273·1. RIGHT. FEMALE, 44 YEARS.

Outer antral wall dense. Track of cells in upper mastoid leading to larger cells in inner and anterior part of lower mastoid. A great part of lower mastoid is diploëtic. Forward lateral sinus. Middle fossa dips down somewhat.

274·1. LEFT. FEMALE, 44 YEARS.

Cellular throughout. Part of antrum above the posterior zygomatic line.

275·1. LEFT. MALE, 45 YEARS.

Outer antral wall dense. Mastoid cellular except for rim of diploë at extreme tip. A few cells in the squama just above the base of the zygoma. High-lying antrum.

276·1. LEFT. MALE, 45 YEARS.

Outer antral wall and mastoid cellular. Tip of mastoid diploëtic. A gap in outer wall of mastoid leading to an anterior inferior mastoid cell. Inner fine outer antral cells marked off from outer coarse cells by a layer of dense bone.

277·1. LEFT. 45 YEARS.

Twice sectioned. Outer antral wall and entire mastoid cellular. Cells running inwards over the lateral sinus and under the semicircular canals.

278·1. RIGHT. MALE, 46 YEARS.

Outer antral wall and entire mastoid cellular. High-lying antrum. Prominent slightly overhanging posterior zygomatic line. Projection upwards of the middle fossa at the free border to the squama at the petro-squamosal junction.

279·1. RIGHT. MALE, 46 YEARS.

Diploëtic infantile type. Small lateral sinus *not* forward. Small high-lying antrum. Prominent posterior zygomatic line. Well-marked groove for the petro-squamosal sinus passing under a bridge pos teriorly to open into the lateral sinus groove.

280·1. RIGHT. MALE, 46 YEARS.

Outer antral wall and entire mastoid cellular. Part of antrum lying above posterior zygomatic line.

281·1. RIGHT. 46 YEARS.

Outer antral wall dense. Cells in upper mastoid. Lower mastoid diploëtic. Middle fossa dips down in front and behind antrum. Front part of Macewen's triangle leads to dura mater. Small lateral sinus. Light thin bone.

282·1. RIGHT. MALE, 47 YEARS.

Outer antral wall dense. Upper mastoid cellular. Lower mastoid diploëtic. Forward lateral sinus.

283·1. LEFT. MALE, 47 YEARS.

Outer antral wall and entire mastoid cellular. High-lying antrum.

284·1. RIGHT. MALE, 48 YEARS.

A few cells in a dense outer antral wall. Mastoid cellular throughout. High-lying antrum. Large mastoid vein canal.

285·1. RIGHT. MALE, 48 YEARS.

Outer antral wall dense. A narrow tortuous series of cells with very dense and thick walls in mastoid. High-lying antrum. Mastoid vein emerging by two canals leaving the lateral sinus groove by one which soon becomes divided.

286·1. RIGHT. MALE, 48 YEARS.

Cellular throughout. Cells running over digastric fossa. Lateral sinus very far back.

287·1. RIGHT. MALE, 48 YEARS.

A few cells in outer antral wall and upper mastoid. Lower mastoid diploëtic.

288·1. RIGHT. MALE, 48 YEARS.

Outer antral wall dense. Upper mastoid cellular. Lower mastoid diploëtic. High-lying antrum. Middle fossa dips down at back part of antrum. Sinus tympani, stapedius canal and descending part of facial canal exposed from behind.

289·1. LEFT. MALE, 48 YEARS.

Outer antral wall and upper mastoid finely cellular. Lower mastoid diploëtic. Forward lateral sinus.

290·1. LEFT. FEMALE, 48 YEARS.

Diploëtic infantile type. Forward lateral sinus. Depression of middle fossa at back of antrum.

291·1. LEFT. FEMALE, 49 YEARS.

Diploëtic infantile type. Forward lateral sinus.

292·1. RIGHT. MALE, 50 YEARS.

Diploëtic infantile type. Forward lateral sinus. Small antrum.

293·1. RIGHT. MALE, 50 YEARS.

Outer antral wall dense. A narrow track of cells passes through the upper mastoid to large cells in the lower mastoid which has a rim of diploë at the tip. Forward lateral sinus. Sulcus jugularis projects into the middle-ear floor.

294·1. RIGHT. MALE, 50 YEARS.

Outer antral wall dense. A few cells in the upper mastoid; lower mastoid diploëtic. Forward lateral sinus. Projection of free border of squama into the roof of the antrum with cells on each side.

295·1. LEFT. MALE, 50 YEARS.

Outer antral and mastoid finely cellular. Tip of mastoid diploëtic. Sharp-pointed process.

296·1. LEFT. MALE, 50 YEARS.

Diploëtic infantile type; the diploë runs through outer antral wall. Forward lateral sinus.

297·1. RIGHT. FEMALE, 50 YEARS.

Diploëtic infantile type. Forward lateral sinus. Small antrum.

298·1. LEFT. FEMALE, 50 YEARS.

Outer antral wall dense. A few cells in upper mastoid; lower mastoid diploëtic. Forward lateral sinus.

299·1. LEFT. MALE, 51 YEARS.

Outer antral wall dense. A few cells running downwards and inwards in upper mastoid. Most of the mastoid diploëtic. Forward lateral sinus.

300·1. RIGHT. FEMALE, 51 YEARS.

Outer antral wall and entire mastoid cellular. Shows relation of carotid canal to the middle ear. Sinus tympani separated into pockets by shelves of bone. Outer pyramidal fossa communicates with the mastoid cells.

301·1. RIGHT. 51 YEARS.

Outer antral wall and upper mastoid finely cellular. Lower mastoid diploëtic.

302·1. LEFT. MALE, 52 YEARS.

Outer antral wall slightly cellular. Mastoid cellular with the exception of a thin rim of diploë at the tip. Forward lateral sinus.

303·1. RIGHT. MALE, 52 YEARS.

Outer antral wall and upper mastoid finely cellular. Lower mastoid densely diploëtic. Cells from roof of antrum running inwards over the superior semicircular canal. Mastoid vein begins single and emerges double.

304·1. RIGHT. FEMALE, 52 YEARS.

Outer antral wall and entire mastoid cellular. Cells running backwards under the lateral sinus and inwards up to the sulcus jugularis. High-lying antrum.

305·1. RIGHT. MALE, 53 YEARS.

Outer antral wall dense. A few cells in a dense upper mastoid. Lower mastoid diploëtic. Forward lateral sinus.

306·1. RIGHT. MALE, 53 YEARS.

Outer antral wall and entire mastoid cellular. Long, narrow, high-lying antrum. Marked remains of the squamo-mastoid suture.

307·1. RIGHT. FEMALE, 53 YEARS.

Outer antral wall and entire mastoid cellular. Cells extending upwards into the squama and over and behind the lateral sinus.

308·1. LEFT. FEMALE, 53 YEARS.

Diploëtic infantile type. The lateral sinus is *not* forward.

309·1. LEFT. 53 YEARS.

Outer antral wall dense. Mastoid cellular, with a rim of diploë at the tip. The mastoid vein starts and emerges double.

310·1. RIGHT MALE, 54 YEARS.

Diploëtic infantile type. Forward lateral sinus.

311·1. RIGHT. MALE, 54 YEARS.

Outer antral wall and upper mastoid cellular. Lower mastoid diploëtic. Large high-lying antrum.

312·1. LEFT. MALE, 54 YEARS.

Diploëtic infantile type. Forward lateral sinus. High-lying antrum.

313·1. LEFT. MALE, 54 YEARS.

Diploëtic infantile type. The lateral sinus is not far forward.

314·1. LEFT MALE, 54 YEARS.

Diploëtic infantile type.

315·1. RIGHT. 54 YEARS.

Outer antral wall slightly cellular. Upper mastoid cellular; lower mastoid diploëtic. Deep sinus tympani.

316·1. RIGHT. MALE, 55 YEARS.

Outer antral wall and mastoid cellular except for tip of process, which is diploëtic. Jugular foramen divided by thin process of bone.

317·1. RIGHT. MALE, 55 YEARS.

Outer antral wall and most of mastoid cellular; diploëtic at the tip. High-lying antrum.

318·1. RIGHT. MALE, 55 YEARS.

Outer antral wall dense. A few cells in the upper mastoid ; the remainder diploëtic.

319·1. LEFT. 55 YEARS.

Outer antral wall dense. Tract of small cells running through upper mastoid to larger cells in lower mastoid. A narrow rim of diploë at the tip. Roof of antrum depressed by dipping down of middle fossa.

320·1. LEFT. 55 YEARS.

Outer antral wall and upper mastoid slightly cellular. Lower mastoid dense, compact bone.

321·1. RIGHT. MALE, 56 YEARS.

Diploëtic infantile type. Very forward lateral sinus, especially at the knee encroaching on Macewen's triangle. External and internal pyramidal fossæ well marked ; the internal or sinus tympani divided by shelf of bone springing from the floor.

322·1. RIGHT. MALE, 56 YEARS.

Diploëtic infantile type. Very large and forward lateral sinus. Small antrum.

323·1. LEFT. MALE, 56 YEARS.

Outer antral wall and upper mastoid finely cellular. Lower mastoid diploëtic. Marked elevation on superior surface corresponding with the line of junction of petrous and squama in front and curving inwards behind.

324·1. LEFT. FEMALE, 56 YEARS.

Diploëtic infantile type. Forward lateral sinus

325·1. LEFT. FEMALE, 56 YEARS.

Outer antral wall and upper mastoid cellular. Lower mastoid diploëtic

326·1. RIGHT. MALE, 57 YEARS.

Diploëtic infantile type. Very marked dipping down of the middle fossa outside and behind the antrum. Macewen's triangle leads to dura mater. Roof of meatus very thin. Lateral sinus is not forward.

327·1. LEFT. MALE, 57 YEARS.

Outer antral wall and upper mastoid cellular. Lower mastoid densely diploëtic. High-lying antrum.

328·1. LEFT. FEMALE, 57 YEARS.

Diploëtic infantile type. Forward lateral sinus. Middle fossa dips down causing a low flat antrum. Macewen's triangle leads to dura mater. Roof of meatus very thin.

329·1. RIGHT. MALE, 58 YEARS.

Cellular throughout except for tip of mastoid which is densely diploëtic. Long narrow antrum, a large part of which lies above the posterior zygomatic line. Forward lateral sinus.

330·1. RIGHT. MALE, 58 YEARS.

Cellular throughout. Large sinus tympani dipping well down. High-lying antrum.

331·1. LEFT. MALE, 58 YEARS.

Diploëtic infantile type. High-lying antrum. Forward lateral sinus.

332·1. RIGHT. FEMALE, 58 YEARS.

Outer antral wall dense. Cells throughout mastoid.

333·1. LEFT. FEMALE, 58 YEARS.

Cellular throughout. Mastoid cells reaching a high sulcus jugularis. Facial nerve in its descending course lying just against the outer wall of the sulcus.

334·1. RIGHT. MALE, 60 YEARS.

Diploëtic infantile type. Forward lateral sinus.

335·1. RIGHT. MALE, 60 YEARS.

Outer antral wall slightly cellular. Mastoid cellular. Tip densely diploëtic. Sinus tympani a pocket.

336·1. RIGHT. MALE, 60 YEARS.

Cellular throughout. Rim of diploë at tip of mastoid. Thinning of the tympanic plate.

337·1. RIGHT. MALE, 60 YEARS.

Cellular throughout. Large long narrow antrum; the postero-internal wall which is devoid of cells is translucent to the cerebellum and lateral sinus. High-lying antrum.

338·1. RIGHT. MALE, 60 YEARS.

Outer antral wall dense. Upper mastoid cellular. Lower mastoid diploëtic. Jugular foramen divided into two by a plate of bone.

339·1. RIGHT. MALE, 60 YEARS.

Outer antral wall cellular. From the antrum, cells run downwards and inwards to the top of the inner aspect of the projecting part of the mastoid, which is mostly diploëtic. Very high-lying antrum. Very forward lateral sinus, encroaching on Macewen's triangle, translucent to posterior meatal wall.

340·1. RIGHT. MALE, 60 YEARS.

Outer antral wall and upper mastoid cellular. Lower mastoid dense above, diploëtic below. Large, long antrum ; the postero-internal wall, which is largely devoid of cells, is translucent to the cerebellum and lateral sinus. Upper part of antrum lies above the posterior zygomatic line.

341·1. LEFT. MALE, 60 YEARS.

Outer antral wall dense. A short tract of cells in the upper mastoid leads to a large cell in lower mastoid, the tip of which is diploëtic. The cell runs over the digastric fossa.

342·1. LEFT. MALE, 60 YEARS.

Finely cellular throughout. High-lying antrum.

343·1. LEFT. MALE, 60 YEARS.

Diploëtic infantile type. The mastoid diploë is very dense indeed.

344·1. RIGHT. FEMALE, 60 YEARS.

Diploëtic infantile type. Lateral sinus is well forward. Remains of petro-squamosal sinus passing under a bridge of bone to open into the lateral sinus groove.

345·1. RIGHT. MALE, 61 YEARS.

Outer antral wall dense. Some large cells in upper mastoid ; lower mastoid diploëtic. The antrum is entirely above the posterior zygomatic line, and it would be easy when attempting to open the antrum in the usual position to mistake the mastoid cells for that cavity.

346·1. RIGHT. MALE, 62 YEARS.

Diploëtic infantile type. Outer surface of mastoid curiously nodular at remains of squamo-mastoid suture. Posterior zygomatic line very prominent. Antrum very high-lying. Lateral sinus is well forward. High-lying jugular bulb. Large mastoid vein.

347·1. RIGHT. MALE, 62 YEARS.

Parts removed, exposing the course of the facial nerve through the middle ear and mastoid. High sulcus jugularis. Curious depression in the lateral sinus groove just before its exit.

348·1. LEFT. MALE, 62 YEARS.

Outer antral wall and upper mastoid cellular; lower mastoid diploëtic. Marked groove for petro-squamosal sinus. Three mastoid veins leave the lateral sinus, one above the other, and open separately on the surface in the same way.

349·1. RIGHT. FEMALE, 62 YEARS.

Outer antral wall cellular. Mastoid cellular except for the tip, which is dense. Cells passing inwards to sulcus and under the semicircular canals.

350·1. RIGHT. MALE, 63 YEARS.

Outer antral wall dense. Mastoid cellular throughout. Large out-pushing sulcus jugularis.

351·1. RIGHT. FEMALE, 63 YEARS.

Outer antral wall dense. A few cells in upper mastoid; remainder diploëtic. Bulging posterior zygomatic line. Middle fossa dips down externally to antrum. Macewen's triangle leads to dura mater.

352·1. LEFT. MALE, 64 YEARS.

Outer antral wall dense. Cells in upper mastoid; lower mastoid diploëtic. The antrum is small, and lies entirely above the posterior zygomatic line, which runs downwards and backwards.

353·1. RIGHT. FEMALE, 64 YEARS.

Diploëtic infantile type.

354·1. RIGHT, FEMALE, 64 YEARS.

Outer antral wall and entire mastoid cellular. Cells running down to the digastric fossa forming a bulla. The middle fossa dips down, causing a sloping roof to the antrum. The upper part of Macewen's triangle leads to dura mater.

355·1. LEFT. MALE, 65 YEARS.

Outer antral wall dense. Some cells in upper mastoid ; lower mastoid diploëtic.

356·1. LEFT. MALE, 67 YEARS.

Some cells in outer antral wall and in upper mastoid ; lower mastoid densely diploëtic. Forward lateral sinus.

357·1. RIGHT. MALE, 68 YEARS.

Outer antral wall and entire mastoid cellular. Large cells in the zygomatic element extending up into the squama. Cells reaching facial nerve in its descending part. Large antrum, which lies partly above the posterior zygomatic line.

358·1. LEFT. MALE, 68 YEARS.

Twice sectioned. Outer antral wall and entire mastoid cellular.

359·1. LEFT. MALE, 68 YEARS.

Outer antral wall and upper mastoid cellular ; lower mastoid diploëtic. High-lying antrum.

360·1. RIGHT. 68 YEARS.

A few small cells in outer antral wall and upper mastoid ; remainder diploëtic. Very high-lying antrum.

361·1. RIGHT. FEMALE, 70 YEARS.

Outer antral wall and entire mastoid cellular. The middle fossa dips down externally to the antrum.

362·1. RIGHT. 70 YEARS.

Outer antral wall very dense. A narrow track of cells in a very dense upper mastoid; lower mastoid diploëtic. Forward lateral sinus. High-lying antrum. Well-marked external and internal pyramidal fossæ. The middle fossa dips down externally to the superior semicircular canal, depressing the roof of the antrum. A curious sulcus at the lower end of the sigmoid sinus.

363·1. LEFT. MALE, 72 YEARS.

Twice sectioned. Outer antral wall and entire mastoid cellular. A curious track running along posterior meatal wall and then running upward and backward; also through outer antral wall and in the cells behind the antrum. ? Healed fracture.

364·1. RIGHT. FEMALE, 72 YEARS.

Outer antral wall dense. Upper mastoid cellular. Lower mastoid diploëtic. Large high out-pushing sulcus jugularis five eighths of an inch from outer surface; it runs up under the aqueductus vestibuli behind and reaches the descending part of the lateral sinus. The facial nerve runs through the outer wall.

365·1. LEFT. MALE, 77 YEARS.

Outer antral wall and entire mastoid cellular, except for tip of process, which is densely diploëtic. The middle fossa dips down externally to the antrum.

366·1. RIGHT. 79 YEARS.

Diploëtic infantile type. The roof of the middle-ear tract and the anterior meatal wall have been removed. Small antrum which lies entirely above the posterior zygomatic line. The middle fossa dips down. Forward lateral sinus.

367·1. RIGHT. 88 YEARS.

Outer antral wall and entire mastoid cellular. Very large mastoid vein running downwards and backwards. Thinning of the tympanic plate.

SECOND SERIES.

SINGLE SPECIMENS ARRANGED ACCORDING TO TYPES OF INTERIOR.

368·1 to 503·1 inclusive.

Acellular or Infantile Types: 368·1 to 407·1 inclusive.

Cellular Types: 408·1 to 503·1 inclusive.

ACELLULAR OR INFANTILE.

368·1. RIGHT. CHILD.

Diploëtic type. The outer antral wall is composed of two layers—(1) an outer of compact bone, (2) an inner of cells which can be seen at the 8th month of fœtal life and remains distinct from all other cells throughout life whatever the type of bone. A thin layer of compact bone separates the cavity of the antrum from the diploëtic mastoid mass. These conditions frequently persist, though on a larger scale, all through life, and constitute the *Diploëtic infantile type* which is of so much importance in suppuration in the middle-ear tract. *See* Pathological Series.

369·1. RIGHT. CHILD.

Diploëtic infantile type. Forward lateral sinus. High jugular bulb. The middle fossa is depressed on each side of a transverse ridge in the roof of the antrum.

370·1. RIGHT. CHILD.

Diploëtic infantile type. The outer compact layer of the outer antral wall is becoming thicker. The lateral sinus is well forward.

371·1. RIGHT. CHILD.

Diploëtic infantile type. The outer compact layer of the outer antral wall has increased in thickness and so has the compact layer between the cavity of the antrum and the diploëtic mastoid mass. The lateral sinus is well forward. The postero-internal antral wall is translucent to the cerebellum and lateral sinus.

372·1. LEFT. CHILD.

Diploëtic infantile type. Very well-marked groove for the petro-squamosal sinus, opening externally between post-glenoid tubercle and anterior edge of tympanic plate and posteriorly into the lateral sinus groove.

373·1. RIGHT. YOUNG SUBJECT.

Diploëtic infantile type.

374·1. RIGHT. YOUNG SUBJECT.

Diploëtic infantile type. The dense outer antral wall has greatly increased in thickness.

375·1. RIGHT. YOUNG SUBJECT.

Diploëtic infantile type. Marked remains of squamo-mastoid suture. Postero-internal antral wall translucent to the cerebellum and lateral sinus.

376·1. RIGHT. ADULT.

Diploëtic infantile type. The roof of middle ear removed. The outer compact layer of the outer antral wall has become thicker, and so has the layer of compact bone between the cavity of the antrum and the diploëtic mastoid mass. The antrum is small. Marked remains of the squamo-mastoid suture. Lateral sinus well forward.

377·1. RIGHT. ADULT.

Diploëtic infantile type. Forward lateral sinus. Small antrum. Large mastoid vein opening externally in the back part of the digastric fossa.

378·1. RIGHT. ADULT.

Diploëtic infantile type. Forward lateral sinus. Middle fossa dips down over posterior part of the antrum, which is rather high-lying.

379·1. RIGHT. ADULT.

Diploëtic infantile type. Facial nerve in its descending course curves inwards after leaving the external semicircular canal, reaching the sulcus jugularis at the occipital junction, the indication of which can be seen running right across the outer wall of the sulcus. Forward lateral sinus reaching the posterior meatal wall, shutting out the apex of the antrum from the surface.

380·1. RIGHT. ADULT.

Diploëtic infantile type. Forward lateral sinus. The Fallopian canal curves inwards after leaving the external semicircular canal.

381·1. RIGHT. ADULT.

Diploëtic infantile type. Small antrum. Forward lateral sinus. Descending part of facial nerve seen from behind; after leaving the external canal it is in communication with a cavity in the petrous portion—“petrous cell.”

382·1. RIGHT. ADULT.

Diploëtic infantile type. High large antrum. High large sulcus jugularis. Lateral sinus is not forward.

383·1. RIGHT. ADULT.

Diploëtic infantile type. Forward lateral sinus.

384·1. RIGHT. ADULT.

Diploëtic infantile type. Postero-internal antral wall very thin and translucent to cerebellum. The lateral sinus is not far forward.

385·1. RIGHT. ADULT.

Diploëtic infantile type. Small forward lateral sinus.

386·1. RIGHT. ADULT.

Diploëtic infantile type. Forward lateral sinus. Postero-internal antral wall is very thin and translucent to the lateral sinus, but not to the cerebellum; roof of antrum removed to show it. The layer of compact bone between the antrum and mastoid mass has not increased much in thickness.

387·1. RIGHT. ADULT.

Diploëtic infantile type. Small forward lateral sinus. Middle fossa dips down somewhat, causing antrum, which is small, to be flat. Roof of meatus very thin.

388·1. RIGHT. ADULT.

Diploëtic infantile type. Middle fossa dips down outside the elevation, which is not caused by the superior semicircular canal. Marked remains of the squamo-mastoid suture.

389·1. RIGHT. ADULT.

Diploëtic infantile type. Thick floor to middle ear.

390·1. MALE ADULT.

Diploëtic infantile type. High-lying antrum. Forward lateral sinus.

391·1. RIGHT. ADULT.

Diploëtic infantile type. Horizontal section below the supra-meatal spine and vertical through the outer antral wall, to demonstrate that the antrum always lies above the level of the spine. Forward lateral sinus. Postero-internal antral wall translucent to cerebellum. Marked groove for petro-squamosal sinus. High-lying sulcus jugularis.

392·1. RIGHT. ADULT.

Diploëtic infantile type. Horizontal section below the supra-meatal spine and vertical through outer antral wall. Postero-internal antral wall thin and translucent to cerebellum and lateral sinus, which is forward.

393·1. LEFT. YOUNG ADULT.

Diploëtic infantile type. Forward lateral sinus. Roof of antrum removed. Postero-internal antral wall translucent to cerebellum.

394·1. LEFT. YOUNG ADULT.

Diploëtic infantile type. Lateral sinus is not forward.

395·1. LEFT. ADULT.

Diploëtic infantile type. Cut surfaces show the line of distinction between the squamous and mastoid elements. Small antrum. Lateral sinus is not forward.

396·1. LEFT. ADULT.

Diploëtic infantile type. Lateral sinus is not forward.

397·1. LEFT. ADULT.

Diploëtic infantile type. Very forward lateral sinus.

398·1. LEFT. ADULT.

Diploëtic infantile type. Small deep antrum. The outer antral wall measures $\frac{3}{4}$ in.—the deepest measurement found. The lateral sinus is not forward.

399·1. LEFT. ADULT.

Diploëtic infantile type. Deep, partly bridged over groove for the petro-squamosal sinus opening into the lateral sinus groove posteriorly. Sinus tympani seen from behind as a pocket dipping down alongside the vestibule, posterior semicircular canal and a high-lying sulcus jugularis. The lateral sinus is not forward.

400·1. LEFT. ADULT.

Diploëtic infantile type. Thin antrum; the cerebellum pushing the postero-internal wall forwards. Forward lateral sinus. Very well-marked partly bridged over petro-squamosal sinus groove opening into lateral sinus groove behind, and beginning to perforate zygoma in front. Depression in remains of masto-squamosal suture is translucent to the lateral sinus groove.

401·1. LEFT. ADULT.

Diploëtic infantile type. Ossified stylo-hyoid ligament. Lateral sinus is not forward.

402·1. RIGHT. CHILD.

Diploëtic infantile type. A thin layer of diploë runs through the outer antral wall; this condition may remain all through life. This condition may be very exaggerated as in the left bone, No. 525·1, and is responsible for cases running an osteomyelitic course when infection spreads from the antrum. See also Specimens 24·1, 26·1, 71·1, 126·1, 135·1, 164·1, 254·1, 296·1, 403·1, 525·1, 581·1. Great depression of the middle fossa externally to the superior semicircular canal causing a low-lying flat, small antrum, the cavity of which is far away from the posterior fossa.

Forward lateral sinus. A canal in knee of Fallopian canal, evidently for a vessel. Superior semicircular canal projects strongly from the surface of the bone.

403·1. LEFT. ADULT.

Diploëtic infantile type. Thin layer of diploë running through the outer antral wall. Forward lateral sinus.

404·1. RIGHT. ADULT.

Dense infantile type. The outer antral wall and entire mastoid are of extreme density. Small antrum. Forward lateral sinus.

Rarely in infants (see First Series, Nos. 13·1, 30·1) the mastoid mass is formed of compact bone and so may continue all through life, forming the *Dense infantile type*, which is of the same importance in suppuration in the middle-ear tract as the diploëtic infantile type. (See Pathological Series.)

405·1. RIGHT. ADULT.

Dense infantile type. The outer antral wall and entire mastoid are of ivory density.

406·1. LEFT. ADULT.

Dense infantile type. The outer antral wall and entire mastoid are formed of dense bone.

407·1. LEFT. ADULT.

Dense infantile type. The outer antral wall and entire mastoid are formed of dense bone. An irregular depression below and behind the meatal spine. The middle fossa dips down, depressing the roof of the antrum.

CELLULAR.

408·1. RIGHT. CHILD.

Sectioned vertically and horizontally to show the arrangement of the diploë, which may be partially or wholly invaded by cells extending from the middle-ear tract in later life. To see the arrangement of the diploë in early life see Specimens 27·1, 33·1, 38·1, 39·1, 44·1, 45·1, 50·1, 53·1, 55·1, 59·1, 63·1, 73·1, 74·1, 92·1.

409·1. RIGHT. CHILD.

Showing commencement of the formation of mastoid cells which are invading the mastoid diploë from the squamous element. The line of invasion is marked by a thin layer of compact bone.

The earliest appearance of mastoid cells is seen at 1 year and 7 months, Specimen 68·1. The cells may be seen fully formed at two years, Specimen 83·1.

410·1. LEFT. CHILD.

Outer antral wall cellular. The mastoid diploë is being invaded by cells along the masto-squamosal junction.

411·1. RIGHT. CHILD.

Twice sectioned. Showing commencement of the formation of mastoid cells which are invading the mastoid diploë from the apex of the antrum and from the squamous element along the line of the masto-squamosal junction. The line of invasion is well seen. The outer compact layer of the outer antral wall is dense and thick and will probably remain so.

412·1. RIGHT. CHILD.

Showing commencement of the formation of mastoid cells. The outer antral wall cellular. The lowermost cells from the squamous element are invading the mastoid diploë. The line of invasion is well seen.

413·1. RIGHT. CHILD.

Showing early commencement of mastoid cells. The squamous portion of the mastoid is cellular and mastoid diploë is being invaded by cells from the apex of the antrum. The outer antral wall is dense.

"Petrous cell" below external canal and behind Fallopian canal and in communication with the latter and not with the sinus tympani.

414·1. RIGHT. CHILD.

Showing commencement of the formation of mastoid cells. The outer antral wall formed by the squama is dense and will remain so. From the apex of the antrum a few cells have invaded the upper mastoid diploë.

415·1. LEFT. CHILD.

Showing commencement of the formation of mastoid cells. The squamous element is entirely cellular. Cells from the apex of the antrum internally to the squamo-mastoid suture are invading the pure mastoid diploë. The line of invasion is well seen.

416·1. RIGHT. YOUNG SUBJECT.

Outer antral wall dense. Cells from the apex of the antrum are invading the "upper mastoid" diploë. The projecting part of the mastoid process or "lower mastoid" is diploëtic. Marked groove for the petro-squamosal sinus.

417·1. RIGHT. YOUNG SUBJECT.

Outer antral wall dense. A narrow track of cells passes through upper mastoid to a long narrow cell in lower mastoid.

418·1. RIGHT. YOUNG SUBJECT.

Outer antral wall cellular. The mastoid diploë has been almost entirely replaced by invading cells, a rim only being left at the tip of the process. It is uncommon not to find some remains of diploë in the adult cellular bones. The middle fossa dips down, causing the roof of the meatus to be very thin and Macewen's triangle to lead to dura mater.

419·1. RIGHT. MALE, ADULT.

Outer antral wall dense. A few cells along the line of the squamo-mastoid suture and in upper mastoid. Lower mastoid very densely diploëtic. Very small mastoid vein.

420·1. RIGHT. MALE, ADULT.

Outer antral wall dense. Some cells in upper mastoid running downwards and inwards. Lower mastoid diploëtic. The invasion line of the cells very well marked.

421·1. RIGHT. MALE, ADULT.

Outer antral wall dense. Large cells in upper mastoid. Diploëtic lower mastoid. Forward lateral sinus.

422·1. RIGHT. ADULT.

Outer antral wall dense. A few cells in the upper and inner part of the upper mastoid. Well-marked external and internal pyramidal fossæ, the latter running outwards below the external semicircular canal. The canal for the stapedius muscle in communication with the Fallopian canal. The mastoid vein runs straight upwards.

423·1. RIGHT. ADULT.

Horizontal section immediately above the level of the supra-meatal spine, and a vertical section through the lower fragment. Outer antral wall dense. Cells in upper mastoid and behind and above the antrum; lower mastoid diploëtic. Marked "lipping" of the outer surface and edge of the mastoid.

424·1. RIGHT. ADULT.

Sectioned in the same way as previous specimen. Outer antral wall dense. Upper mastoid cellular; lower mastoid diploëtic. Large mastoid vein with a curious dip in its course.

425·1. RIGHT. ADULT.

Sectioned vertically and horizontally. Outer antral wall dense. A few cells in upper mastoid; lower mastoid diploëtic.

426·1. RIGHT. ADULT.

Outer antral wall dense. A few cells in upper mastoid; lower mastoid diploëtic. Forward lateral sinus.

427·1. RIGHT. ADULT.

Outer antral wall dense. Fine cells in upper mastoid; lower mastoid diploëtic. High-lying antrum. Forward lateral sinus.

428·1. RIGHT. ADULT.

Outer antral wall dense. Cells in upper mastoid; lower mastoid densely diploëtic.

429·1. RIGHT. ADULT.

Outer antral wall dense. Large cell in upper mastoid; lower mastoid diploëtic. Knee of lateral sinus rather forward. Two mastoid veins from the lateral sinus, the lower having a particularly curved course through the bone.

430·1. RIGHT. ADULT.

Outer antral wall dense. Cells running downwards and backwards to lateral sinus groove, where the partition is very thin; remainder of mastoid diploëtic. High-lying antrum. Large, deep sinus tympani running backwards, outwards and downwards behind the facial nerve to below the loop of the external semicircular canal; the inner wall formed by the vestibule, posterior semicircular canal and sulcus jugularis, where the bone is very thin. Remains of petro-squamosal sinus passes under a bridge to open into the lateral sinus groove.

431·1. RIGHT. ADULT.

Outer antral wall dense. Cells in upper mastoid just invading lower mastoid, the remainder of which is diploëtic. High-lying antrum.

432·1. RIGHT. ADULT.

Outer antral dense. Cells running downwards and inwards through upper mastoid, and reaching the inner aspect of the lower mastoid, the remainder of which is diploëtic. Small antrum. Middle fossa dips down outside antrum, which really corresponds to Macewen's triangle, but dura mater intervenes at the upper part.

433·1. RIGHT. ADULT.

Outer antral wall dense. Narrow track of cells passing from the antrum to cells in mastoid. Tip of process diploëtic. Forward lateral sinus. High-lying antrum.

434·1. LEFT. ADULT.

Outer antral wall dense. A few cells at the squamo-mastoid junction in a dense upper mastoid; lower mastoid diploëtic. Large forward lateral sinus. High-lying antrum.

435·1. LEFT. ADULT.

Outer antral wall very dense. A narrow track of cells in the line of the squamo-mastoid junction passes through to larger cells in lower part of upper mastoid; lower mastoid diploëtic. Cells from upper part of antrum running backwards and outwards to lateral sinus, which is not forward.

436·1. LEFT. ADULT.

Outer antral wall dense. Cells in upper mastoid; lower mastoid diploëtic. Flat antrum, which is very small and high-lying.

437·1. LEFT. ADULT.

Outer antral wall dense. Cells in upper mastoid; lower mastoid densely diploëtic. Large mastoid vein canal behind and internal to digastric fossa, with two smaller ones just behind the base of the mastoid. Small but marked groove for the petro-squamosal sinus, which passes under a bridge to open into the lateral sinus groove.

438·1. LEFT. ADULT.

Outer antral wall dense. A narrow track of cells with dense walls passing through entire mastoid. Small mastoid vein.

439·1. RIGHT. ADULT.

A few small cells in outer antral wall and upper mastoid; lower mastoid diploëtic. High-lying antrum. Forward lateral sinus. Out-pushing sinus jugularis above the petro-occipital suture.

440·1. RIGHT. ADULT.

A few fine cells in outer antral wall and in upper mastoid; lower mastoid diploëtic. Forward lateral sinus.

441·1. RIGHT. ADULT.

A few cells in outer antral wall and upper mastoid; lower mastoid diploëtic.

442·1. RIGHT. ADULT.

Outer antral wall and upper mastoid cellular; lower mastoid diploëtic. Forward lateral sinus. High-lying antrum. High out-pushing sulcus jugularis with posterior semicircular canal lying against it.

443·1. RIGHT. ADULT.

Outer antral wall and upper mastoid cellular. Cells extend well up into squama and forwards into zygoma. Lower mastoid diploëtic. Forward lateral sinus below antrum, which lies rather high.

444·1. RIGHT. ADULT.

Sectioned vertically and horizontally. Outer antral wall and upper mastoid cellular; lower mastoid densely diploëtic.

445·1. LEFT. ADULT.

Outer antral wall slightly cellular. Large cells in upper mastoid. Lower mastoid diploëtic. High-lying antrum. Middle fossa dips down externally to the superior semicircular canal.

446·1. RIGHT. ADULT.

Fine cells in outer antral wall and throughout mastoid, except for the tip, which is diploëtic. There are few cellular mastoids which have not more or less diploë remaining at the tip.

447·1. RIGHT. ADULT.

Outer antral wall and mastoid cellular with the exception of the tip, which is diploëtic.

448·1. RIGHT. ADULT.

Outer antral wall and entire mastoid cellular with the exception of the tip, which is diploëtic. Marked recess above the canal for the tensor tympani. The external and internal pyramidal recesses well marked. The external is a pocket. Cells in the floor of the middle ear extend inwards under the cochlea and over the carotid canal and reach the internal diploë.

449·1. RIGHT. ADULT.

Fine cells in outer antral wall and upper mastoid. Lower mastoid partly dense and partly diploëtic.

450·1. RIGHT. ADULT.

A few cells in outer antral wall and mastoid with dense cortex. Cells run upwards and backwards from behind the antrum. A rim of diploë at the tip of the process.

451·1. RIGHT. ADULT.

Outer antral wall slightly cellular. Mastoid cellular with the exception of the tip, which is partly dense and partly diploëtic. External and internal pyramidal recesses small but deep; the external forms a pocket.

452·1. RIGHT. ADULT.

Outer antral wall and mastoid cellular. Tip of process diploëtic. Cells from the floor of the middle ear run under the first turn of the cochlea and above the sulcus jugularis.

453·1. RIGHT. ADULT.

Outer antral wall and entire mastoid cellular with the exception of the tip of the process, which is diploëtic. High jugular bulb. Small sinus tympani divided into two cavities by a shelf of bone.

454·1. RIGHT. ADULT.

Outer antral wall dense with a large cell in lower part. Cells in mastoid except for tip, which is diploëtic. Cells from the antrum run inwards below the semicircular canals above the lateral sinus up to the outer wall of the sulcus jugularis. A large cell passes backwards under the lateral sinus and just below a large canal for the mastoid vein, forming a digastric bulla.

455·1. RIGHT. ADULT.

Outer antral wall and mastoid cellular with the exception of the tip, which is diploëtic. Lateral sinus well forward.

456·1. RIGHT. ADULT.

Outer antral wall and mastoid cellular. Tip of process diploëtic.

457·1. RIGHT. ADULT.

Outer antral wall and mastoid cellular. Tip of process diploëtic.

458·1. RIGHT. ADULT.

Outer antral wall slightly cellular. Cells throughout mastoid with the exception of the tip, which is diploëtic. High out-pushing sulcus jugularis. Forward lateral sinus. High-lying antrum. Mastoid vein starts and emerges double.

459·1. RIGHT. ADULT.

Outer antral wall and nearly the whole mastoid cellular. Tip of process diploëtic. Forward lateral sinus. High-lying antrum.

460·1. RIGHT. ADULT.

Outer antral wall and entire mastoid cellular with the exception of the tip, which is diploëtic.

461·1. RIGHT. ADULT.

Twice sectioned. Cellular throughout except for the tip, which is diploëtic. Cells invading the occipital alongside high out-pushing sulcus jugularis. Cells pass over meatus to zygoma. Thin middle-ear floor. Large antrum; the postero-internal wall devoid of cells. A ledge of bone passes from the inner extremity of the meatus to the pyramid arching over the external pyramidal recess.

462·1. RIGHT. ADULT.

Outer antral wall and entire mastoid finely cellular, except for the tip, which is diploëtic. High-lying antrum. The cells of the squamous element are well marked off from those of the petrous.

463·1. RIGHT. ADULT.

Outer antral wall and entire mastoid cellular with the exception of a thin rim of diploë at the tip. Very large mastoid vein canal.

464·1. RIGHT. ADULT.

Cells in outer antral wall and throughout mastoid except for the extreme tip, which is diploëtic. Lipping of the edge of the mastoid process.

465·1. RIGHT. ADULT.

Outer antral wall and entire mastoid cellular with the exception of the extreme tip, which is diploëtic. In the outer antral wall the outer coarser cells are marked off from the inner finer "fœtal" cells by a layer of compact bone.

466·1. RIGHT. ADULT.

Outer antral wall and entire mastoid cellular; diploë at the tip. The cells pass down to the digastric and occipital grooves, and inwards behind the facial nerve under the vestibule and outer extremity of the internal auditory meatus. Large lateral sinus. Small sulcus jugularis.

467·1. RIGHT. ADULT.

Outer antral wall and entire mastoid cellular, with exception of slight rim of diploë at the tip. High-lying antrum. A thin spicule of bone runs across the opening of a deep external pyramidal recess from the posterior extremity of the bony meatus to the pyramid.

468·1. RIGHT. ADULT.

Outer antral wall and entire mastoid cellular, with the exception of a slight rim of diploë at the tip. Two mastoid vein canals side by side, with a small sulcus at the external opening of the upper one.

469·1. RIGHT. ADULT.

Outer antral wall and entire mastoid cellular, with minute rim of diploë at the tip. External pyramidal fossa and sinus tympani well marked, the latter running right under the external canal and behind the facial nerve, reaching the vestibule. Antero- and postero-internal antral walls cellular. High sulcus jugularis with mastoid cells running right up to it.

470·1. RIGHT. ADULT.

Outer antral wall and entire mastoid cellular, with a very slight rim of diploë at the tip. Two mastoid vein canals emerging side by side immediately above and behind the base of the mastoid.

471·1. RIGHT. ADULT

Twice sectioned. Outer antral wall and entire mastoid cellular, with very slight rim of diploë at the tip. External pyramidal fossa well marked. Large antrum. Lateral sinus partition devoid of cells and very thin.

472·1. RIGHT. ADULT.

Outer antral wall and entire mastoid cellular; very slight rim of diploë at the tip. Marked "lipping" of the mastoid edge.

473·1. RIGHT. ADULT.

Outer antral and entire mastoid cellular; very slight rim of diploë at the tip.

474·1. RIGHT. ADULT.

Outer antral wall and entire mastoid cellular; very slight diploë at the tip. High-lying antrum. Long narrow sinus tympani dipping well down. The inferior crus of the posterior semicircular canal bulges into its inner wall. The cells in squamous part of mastoid marked off from those in the petrous element

475·1. RIGHT. ADULT.

Sectioned vertically and horizontally. Outer antral wall and entire mastoid cellular, with a diploëtic tip. Large upper mastoid cells run inwards to the high-lying sulcus jugularis. The relations of the vestibule are well seen.

476·1. RIGHT. ADULT.

Mastoid process twice sectioned. Cellular throughout, with slight diploë at the tip. Large, long, high-lying antrum. Marked "lipping" of the bone behind the base of the mastoid process.

477·1. RIGHT. ADULT.

Cells in outer antral wall and mastoid except for the tip, which is diploëtic.

478·1. LEFT. ADULT.

Cells in outer antral wall and mastoid running down to inner aspect of the process, which has a rim of diploë at tip. High-lying antrum. Curious opening in the lateral sinus groove just below the knee.

479·1. LEFT. ADULT.

Cellular throughout with the exception of the tip, which is diploëtic.

480·1. LEFT. MALE ADULT.

Outer antral wall and mastoid cellular, with rim of diploë at the tip. Deep sinus tympani. Large forward lateral sinus.

481·1. LEFT. ADULT.

Outer antral wall and mastoid cellular, with rim of diploë at the tip. Dense cortex.

482·1. LEFT. ADULT.

Outer antral wall and mastoid cellular. Slight rim of diploë at the extreme tip.

483·1. LEFT. ADULT.

Outer antral wall and entire mastoid cellular, with the exception of the extreme tip, which is diploëtic. The cells run backwards over and under the lateral sinus.

484·1. LEFT. ADULT.

Outer antral wall and mastoid cellular, with the exception of a slight rim of diploë at the extreme tip. High sulcus jugularis, with an inner and outer recess. Cells run inwards up to the outer wall of the sulcus jugularis.

485·1. LEFT. ADULT.

Outer antral wall and mastoid cellular; tip of mastoid diploëtic. A gap in the superior petrosal groove, with foramina for vessels in the superior border just above and externally to the internal auditory meatus.

486·1. LEFT. ADULT.

Outer antral wall and entire mastoid cellular with the exception of slight rim of diploë at the tip. High-lying antrum. Postero-internal antral wall devoid of cells and very thin and translucent to the cerebellum. Sinus tympani seen from behind lying against the inferior extremity of the posterior canal, with the external canal arching over it and the facial nerve lying externally.

487·1. LEFT. ADULT.

Outer antral wall and entire mastoid cellular with slight rim of diploë at the tip. Marked projection of the edge of squama into the roof of the antrum at the petro-squamosal suture. Large, forward lateral sinus with the canal for the mastoid vein running backwards and opening on the surface five eighths of an inch behind the base of the mastoid process, where a sulcus is formed which receives other veins.

488·1. LEFT. ADULT.

Cellular throughout with suspicion of diploë at the tip. High-lying antrum. A fairly large mastoid cell lying close to the sulcus jugularis behind the descending portion of the facial nerve.

489·1. LEFT. ADULT.

Outer antral wall and entire mastoid cellular with a very small mass of diploë at the tip. The superior cells are very large and extend backwards over and under the lateral sinus. Cells extend inwards between the bony labyrinth and the sulcus jugularis and reach the internal diploëtic mass. Remains of petro-squamosal sinus groove passes under a bridge to open into the lateral sinus groove.

490·1. LEFT. ADULT.

Cellular throughout with very slight diploë at tip. Marked groove, partly bridged over, for the petro-squamosal sinus opening into lateral sinus groove after passing under a bridge of bone ; in front the sinus perforates the base of the zygoma.

491·1. LEFT. ADULT.

Outer antral wall and mastoid cellular, with slight diploë at tip. High-lying sulcus jugularis with an inner and outer recess in the roof.

492·1. LEFT. ADULT.

Outer antral wall and mastoid cellular with very slight diploë at tip. The sinus tympani is a narrow deep cleft running under the facial nerve.

493·1. LEFT. ADULT.

Outer antral wall and mastoid cellular with a slight rim of diploë at the tip. Inferior cells large and running backwards over the lateral sinus. A small pedunculated exostosis in the front mastoid cells. Very high-lying antrum.

494·1. RIGHT. ADULT.

Outer antral wall and entire mastoid cellular. No diploë at the tip. Inferior cells large. High-lying antrum. Postero-internal antral wall devoid of cells and translucent to cerebellum. Descending portion of facial nerve exposed from behind.

495·1. RIGHT. ADULT.

Cellular throughout. No diploë. High-lying antrum. Cells extend backwards over and behind the lateral sinus.

496·1. RIGHT. ADULT.

Outer antral wall and entire mastoid coarsely cellular. No diploë. Cells pass over and behind the lateral sinus, forming a digastric bulla behind and below the mastoid process and below the mastoid emissary vein.

497·1. RIGHT. ADULT.

Outer antral wall and entire mastoid cellular. No diploë. Cells extend up into squama and in back part of the floor of the middle ear run inwards between the vestibule and internal auditory meatus above and the sulcus jugularis below and reach the internal diploë. A high-lying sulcus jugularis does not allow of this extension of cells to the internal mass of diploë.

498·1. RIGHT. ADULT.

Outer antral wall and entire mastoid cellular. Well-marked external and internal pyramidal recesses. Antrum lies rather high. Huge mastoid vein canal. Forward lateral sinus at upper part. Curious opening of superior petrosal into lateral sinus. Cellular bulge in digastric fossa forming a digastric bulla.

499·1. LEFT. ADULT.

Outer antral wall and entire mastoid cellular. No diploë.

500·1. LEFT. ADULT.

Outer antral wall and entire mastoid cellular. No diploë. The cells running up into the squama.

501·1. LEFT. ADULT.

A few cells in outer antral wall. Mastoid cellular. Perforation in zygoma for the remains of petro-squamosal sinus. High-lying antrum. Depression in remains of masto-squamosal suture translucent to lateral sinus groove.

502·1. RIGHT. ADULT.

Cellular throughout. No diploë. From inner antral wall cells pass inwardsthrough loop of superior canal over vestibule and internal meatus and invade upper part of the internal diploëtic mass. Upper mastoid cells pass inwards behind the facial nerve under the vestibule and internal meatus. Cells extend to occipital and digastric grooves and invade the occipital diploë.

·1. RIGHT. ADULT.
503·1.

Extremely cellular bone throughout. High antrum. Cells pass well over the lateral sinus, which has been cleared of cells, and inwards over the digastric fossa; some pass under the loop of the superior canal over the vestibule and internal auditory meatus and invade the internal diploë from above; others pass below the vestibule and internal auditory meatus and above the sulcus jugularis and invade the internal diploë from below. Invasion of most of the diploë is seen in First Series, No. 154·1, and in both bones of 628·1, Double Series.

THIRD SERIES.

DOUBLE SPECIMENS ARRANGED ACCORDING TO AGE AND SEX.

504·1 to 650·1 inclusive.

Males: 504·1 to 592·1 inclusive.
Females: 593·01 to 650·1 inclusive.

MALES.

504·1. RIGHT AND LEFT. MALE, 2 MONTHS.

The interiors are symmetrical and are of the diploëtic infantile type. There is a distinct layer of compact bone between the squamous diploë and the cells lining the outer antral wall.

504·11. RIGHT AND LEFT. MALE, 2 MONTHS AND 2 WEEKS.

The interiors are symmetrical and are of the diploëtic infantile type.

504·12. RIGHT AND LEFT. MALE, 9 MONTHS.

The interiors are symmetrical, and are of the diploëtic infantile type. Groovings for the petrosquamosal sinus can be seen on both sides; on the left side the sinus passes under a bridge before opening into the lateral sinus groove.

505·1. RIGHT AND LEFT. MALE, 1 YEAR.

The interiors are symmetrical, and are of the diploëtic infantile type. Both bones dissected to show the middle-ear tracts and their relations to the labyrinths.

505·11. RIGHT AND LEFT. MALE, 1 YEAR.

The interiors are symmetrical and are of the diploëtic infantile type with dense outer antral walls which are becoming thick.

506·1. RIGHT AND LEFT. MALE, 1 YEAR AND 9 MONTHS.

The interiors are symmetrical, and are of the diploëtic infantile type. Both bones dissected as in 505·1.

507·1. RIGHT AND LEFT. MALE, 2 YEARS.

The left bone shows commencing cellular invasion of the mastoid diploë from the apex of the antrum; the right does not. The left mastoid process is more marked, and the digastric groove and sulcus jugularis are deeper than the right.

508·1. RIGHT AND LEFT. MALE, 2 YEARS AND 2 MONTHS.

The interiors are symmetrical, and are still of the diploëtic infantile type. On both sides the roof of the middle-ear tract has been removed and an artificial perforation made at the site of the meatal spine leading to the apex of the antrum.

The left lateral sinus groove is larger and more forward, and the sulcus jugularis is larger and deeper than the right.

509·1. RIGHT AND LEFT. MALE, 3 YEARS AND 3 MONTHS.

The interiors are symmetrical, and are still of the diploëtic infantile type. Groove for the petro-squamosal sinus well marked on both sides, but more so on the left; the right passes under a slight bridge of bone posteriorly before opening into the lateral sinus groove; the left is open at the same point, and is joined by a diploic vein just before reaching the lateral sinus groove. The external opening for the sinus between the post-glenoid tubercle and the vaginal plate is present on both sides, but larger on the left.

The left lateral sinus and sulcus jugularis are larger than the right.

Huschke's foramen is unclosed by bone on the right side, but closed on the left.

509·12. RIGHT AND LEFT. MALE, 5 YEARS.

The interiors are symmetrical and are of the diploëtic infantile type.

509·13. RIGHT AND LEFT. MALE, 5 YEARS AND 6 MONTHS.

The interiors are symmetrical. The outer antral walls and mastoids are cellular with a diploëtic tip to the latter. The antra are large.

509·14. RIGHT AND LEFT. MALE, 6 YEARS.

Right: cellular throughout. Cells running inwards to a high lying sulcus jugularis.

Left: incomplete.

509·15. RIGHT AND LEFT. MALE, 6 YEARS.

The interiors are symmetrical and are cellular.

509·16. RIGHT AND LEFT. MALE, 6 YEARS AND 6 MONTHS.

The interiors are symmetrical. The antra are large. The outer antral walls are dense. Cells are present in the upper mastoids along the squamo-mastoid suture. The lower mastoids are diploëtic.

509·17. RIGHT AND LEFT. MALE, 6 YEARS AND 6 MONTHS.

The interiors are symmetrical, and are cellular. A layer of diploë runs through the outer antral walls and is continuous with diploë in the mastoids. The left lateral sinus and sulcus jugularis are larger than the right.

509·18. RIGHT AND LEFT. MALE, 7 YEARS AND 6 MONTHS.

Right bone: Dense outer antral wall; commencing cellular formation along squamo-mastoid junction.

Left bone: Cellular outer antral wall and upper mastoid. Lower mastoid diploëtic.

510·1. RIGHT AND LEFT. MALE, 8 YEARS AND 6 MONTHS.

The interiors are symmetrical. Fine cells in the outer antral walls and upper mastoids ; tip of mastoids diploëtic.

Huschke's foramen open on the right side and closed on the left.

511·1. RIGHT AND LEFT. MALE, 9 YEARS.

Right bone : Fine cells in the outer antral wall and mastoid ; the tip of the latter is diploëtic. Marked groove for the anterior remains of the petro-squamosal sinus. The inner surface of the zygoma is deeply grooved. The base of the post-glenoid tubercle is pierced by three foramina, which lead to the groove internally.

Left bone : Finely cellular throughout the outer antral wall and mastoid. The lateral sinus groove and sulcus jugularis are larger than the right. There is no grooving for the petro-squamosal sinus.

512·1. RIGHT AND LEFT. MALE, 9 YEARS.

Right bone : Cellular outer antral wall and upper mastoid, and diploëtic lower mastoid. On this side only there is a deep groove for the petro-squamosal sinus, which passed under a bridge of bone posteriorly to open into the lateral sinus, and anteriorly opened on the surface through a foramen in the base of the zygoma. A small opening is present on the left side at the outer end of the Glaserian fissure.

At the emergence of the right mastoid vein is a regular sulcus running upwards for half an inch ; a small diploic vein opens into it at its upper part.

Left bone : Cellular throughout, and the mastoid process is distinctly larger and more rounded than the right.

512·11. RIGHT AND LEFT. MALE, 9 YEARS.

The interiors are symmetrical and are of the diploëtic infantile type with dense outer antral walls.

512·12. MALE, 10 YEARS.

The interiors are symmetrical and are of the diploëtic infantile type with thick dense outer antral walls.

513·1. RIGHT AND LEFT. MALE, 11 YEARS.

The interiors are symmetrical, both bones being of the diploëtic infantile type. Part of the diploë on the right side has been accidentally removed.

513·4. RIGHT AND LEFT. MALE, 14 YEARS.

The interiors are symmetrical and finely cellular throughout outer antral walls and mastoids. Cells extending to digastric and occipital fossæ on the left side.

514·1. RIGHT AND LEFT. MALE, 16 YEARS.

The interiors are symmetrical. The outer antral walls are partly cellular and partly dense, and narrow tracks of cells run along the squamo-mastoid sutures and come close to the surface; the rest of the mastoids are diploëtic.

Both antra are high-lying to Macewen's triangle.

515·1. RIGHT AND LEFT. MALE, 17 YEARS.

Right bone: The outer antral wall is dense, with a few cells scattered through it. The upper mastoid is finely cellular; the lower mastoid diploëtic.

Left bone (see Pathological Series, Chronic Middle-Ear Suppuration, No. 45·1) is of the diploëtic infantile type. The lateral sinus is larger and more forward than the right.

516·1. RIGHT AND LEFT. MALE, 20 YEARS.

The interiors are very similar except that the outer antral wall is dense on the right side and finely cellular on the left. The upper mastoids are cellular, and the lower mastoids diploëtic. The right bone is fractured through the labyrinth. (See Pathological Series, No. 35·1.)

516·2. RIGHT AND LEFT. MALE 21 YEARS.

The interiors are symmetrical. The outer antral walls are dense. Cells with dense surroundings are present in the upper mastoids.

517·1. RIGHT AND LEFT. MALE, 24 YEARS.

The interiors are nearly symmetrical. The outer antral walls and mastoids are cellular with a rim of diploë at the tip of the mastoids. The right bone shows a large digastric bulla. The right mastoid vein is large and the left rudimentary.

518·1. RIGHT AND LEFT. MALE, 24 YEARS.

The interiors are nearly symmetrical; the left is of the diploëtic infantile type; the right has a dense outer antral wall and a few cells in the upper part of a diploëtic mastoid.

518·2. RIGHT AND LEFT. MALE, 24 YEARS.

The interiors are symmetrical. The outer antral walls and mastoids are cellular, with diploëtic tips to the latter. Both antra are high-lying to Macewen's triangle.

518·4. RIGHT AND LEFT. MALE, 26 YEARS.

The interiors are symmetrical. The outer antral walls are dense. A few cells are present in the upper mastoids along the squamo-mastoid junction; the remainder of the mastoids are diploëtic.

The left sulcus jugularis is larger than the right. Both antra are high-lying.

518·5. RIGHT AND LEFT. MALE, 26 YEARS.

Right bone: Dense outer antral wall. Large cells in upper mastoid.

Left bone: Cellular outer antral wall. Large cells in upper mastoid.

519·1. RIGHT AND LEFT. MALE, 27 YEARS.

The interiors are nearly symmetrical and are cellular throughout. The left mastoid cortex is thicker than the right and the tip of the mastoid is diploëtic. On the left side only, cells from the floor of the middle ear run inwards under the cochlea and internal auditory meatus. On the right side a high-lying sulcus jugularis prevents this inward spread of cells. The descending part of the facial nerve is well seen on both sides; on the right side it lies against the high-lying sulcus jugularis.

520·1. RIGHT AND LEFT. MALE, 28 YEARS.

The interiors are asymmetrical. The right is of the diploëtic infantile type; the left has a dense outer antral wall, cellular upper mastoid and diploëtic lower mastoid. The right mastoid vein is very small; the left is larger and starts single but emerges double.

521·1. RIGHT AND LEFT. MALE, 28 YEARS.

The interiors are symmetrical, both being of the diploëtic infantile type. Both antra are high-lying to Macewen's triangle. The middle fossa dips down on the right side only, causing a sloping roof to the antrum.

521·11. RIGHT AND LEFT. MALE, 28 YEARS.

Right bone: Dense outer antral wall. A few cells in upper mastoid. Lower mastoid diploëtic.

Left bone: Cellular antral wall. Large cells in upper mastoid. Both antra are high-lying to Macewen's triangle.

521·12. RIGHT AND LEFT. MALE, 28 YEARS.

Both bones are cellular throughout. On both sides the cells extend into the floor of the meatus.

On the right side the cells extend up to and over the sulcus jugularis and are separated by the plate of bone from the posterior fossa internally to the lateral sinus groove and below the aqueductus vestibuli.

On the left side the cells extend over the sulcus jugularis and below the labyrinth and invade the lower part of the apical diploë, where pus could burst through to the naso-pharynx; cells can be seen on the posterior surface passing inwards above the aqueductus vestibuli and below the internal auditory meatus.

522·1. RIGHT AND LEFT. MALE, 30 YEARS.

The interiors are symmetrical and are of the diploëtic infantile type. The left lateral sinus groove and sulcus jugularis are larger than the right.

523·1. RIGHT AND LEFT. MALE, 30 YEARS.

The outer antral walls and upper mastoids are cellular and the lower mastoids diploëtic. On the left side cells from the back part of the floor of the middle ear extend inwards under the vestibule and internal auditory meatus and over a shallow and low-lying sulcus jugularis; but on the right side where the sulcus jugularis is high-lying this extension is absent.

524·1. RIGHT AND LEFT. MALE, 33 YEARS.

Right bone: The outer antral wall and entire mastoid are cellular with a slight rim of diploë at the tip.

Left bone: Similar to the right, but the lower mastoid is entirely diploëtic. The antrum is high-lying to Macewen's triangle, on both sides. Huschke's foramen is unclosed by bone on the left side.

525·1. RIGHT AND LEFT. MALE, 33 YEARS.

Right bone: The outer antral wall is dense; a few cells run downwards from the apex of the antrum; the rest of the mastoid is diploëtic.

Left bone: The outer antral wall is diploëtic, the diploë being separated from the fœtal cells by a thin layer of compact bone; the mastoid is entirely diploëtic. The zygomatic, squamous and petrous masses of diploë are marked off from one another by thin layers of compact bone. This type of bone is responsible for the extension of infection from the antrum running an osteomyelitic course. The lateral sinus groove and sulcus jugularis are larger than the right.

The man was a congenital imbecile.

526·1. RIGHT AND LEFT. MALE, 33 YEARS.

The interiors are symmetrical and are of the diploëtic infantile type. Both lateral sinuses are large and well forward, the right especially. The mastoid vein on both sides starts single and emerges double, on the right side the external openings are placed one behind the other with a sulcus at the opening of the posterior while on the left side the openings are one above the other with a sulcus at the lower.

527·1. RIGHT AND LEFT. MALE, 34 YEARS.

The interiors are symmetrical. The outer antral walls and mastoids, with the exception of the tips, which are diploëtic, are cellular. The mastoid cells are very large; on the right side they run inwards to a high-lying sulcus jugularis, at which point a thin partition of bone separates them from the posterior fossa internally to the lateral sinus groove. The antrum is high-lying to Macewen's triangle on both sides.

528·1. RIGHT AND LEFT. MALE, 34 YEARS.

The interiors are symmetrical and are of the diploëtic infantile type. Both antra are high-lying to Macewen's triangle, the right more than the left.

529·1. RIGHT AND LEFT. MALE, 35 YEARS.

The interiors are symmetrical. The outer antral walls and entire mastoids are finely cellular. The cells run inwards to the sulcus jugularis on both sides.

530·1. RIGHT AND LEFT. MALE, 35 YEARS.

The interiors are asymmetrical.

Right bone: The outer antral wall is dense; a narrow tract of cells passes through the upper dense mastoid; the lower mastoid is diploëtic.

Left bone: The outer antral wall and mastoid are cellular, with a rim of diploë at the tip of the latter.

531·1. RIGHT AND LEFT. MALE, 35 YEARS.

The interiors are symmetrical and are of the diploëtic infantile type. The left lateral sinus groove and sulcus jugularis are larger than the right.

532·1. RIGHT AND LEFT. MALE, 36 YEARS.

The interiors are symmetrical. The outer antral walls and entire mastoids are cellular, with a rim of diploë which is more marked on the left side at the tip of the latter.

533·1. RIGHT AND LEFT. MALE, 36 YEARS.

Marked asymmetry.

Right bone: Diploëtic infantile type.

Left bone: Dense outer antral wall. Cellular upper mastoid. Diploëtic lower mastoid. The lateral sinus groove and sulcus jugularis are larger than the right.

533·11. RIGHT AND LEFT. MALE, 36 YEARS.

Right bone: The outer antral wall is dense and thick. Cells are present at the inner part of the upper mastoid, the remainder of which is diploëtic.

Left bone: The outer antral wall is partly dense and partly cellular. The mastoid is cellular throughout.

534·1. RIGHT AND LEFT. MALE, 37 YEARS.

The interiors are asymmetrical.

Right bone: Diploëtic infantile type, the diploë of the squama is marked off from that of the petrous by two parallel lines of thin compact bones.

Left bone: Fine cells in the outer antral wall and mastoid with diploë at the tip of the latter. The lateral sinus, sulcus jugularis and mastoid vein are larger than the right.

535·1. RIGHT AND LEFT. MALE, 38 YEARS.

The interiors are symmetrical and cellular throughout. The mastoid cells are large. A rim of diploë, more marked on the right side, is present at the tip of the mastoids.

Cells are present in the zygoma on both sides.

The lateral sinus and sulcus jugularis are larger on the left side.

The descending part of the Fallopian canal is well seen in the left bone.

536·1. RIGHT AND LEFT. MALE, 38 YEARS.

The interiors are symmetrical and cellular throughout. Very slight diploë is present at the extreme tip of each mastoid.

The upper mastoid cells run inwards behind the middle ear, under the vestibule and cochlea, and over the sulcus jugularis on both sides.

537·1. RIGHT AND LEFT. MALE, 39 YEARS.

The interiors are asymmetrical.

Right bone: The outer antral wall and entire mastoid are cellular, with a rim of diploë at the tip of the latter. The cells extend backwards over the lateral sinus to well behind the mastoid process and upwards behind the antrum.

Left bone : The outer antral wall is dense, and the mastoid is cellular except for a rim of diploë at the tip. There is not the extension of cells backwards and upwards as on the right side. The lateral sinus is larger and more forward, and the sulcus jugularis is larger and deeper than on the right side. The antrum is high-lying to Macewen's triangle on both sides.

538·1. RIGHT AND LEFT. MALE, 39 YEARS.

The interiors are symmetrical and are cellular throughout. A large antrum is present on both sides. The opening of the sinus tympani on the right side is crossed by spicules of bone. On the left side the section passes through the sinus tympani, which is a narrow cleft with the posterior canal bulging into it. The mastoid cells on the left side extend inwards behind the middle ear, over the sulcus jugularis, and under the vestibule and internal auditory meatus.

539·1. RIGHT AND LEFT. MALE, 39 YEARS.

Right bone : The outer antral wall and upper mastoid are cellular ; the lower mastoid is diploëtic. The lateral sinus is well forward, and the mastoid vein is duplicated at start and exit.

Left bone : Very much the same, but the cells extend more into the lower mastoid, the tip of which has a rim of diploë. The mastoid vein is much larger than the right.

The antrum is high-lying to Macewen's triangle on both sides.

540·1. RIGHT AND LEFT. MALE, 39 YEARS.

The interiors are markedly asymmetrical.

Right bone : Diploëtic infantile type. The antrum is large, and the postero-internal wall is thin and translucent to the lateral sinus and cerebellum.

Left bone : The outer antral and most of the upper mastoid are cellular, the cells running downwards and inwards ; the rest of the mastoid is diploëtic. On this side only the middle fossa dips down, causing a sloping roof to the antrum.

541·1. RIGHT AND LEFT. MALE, 39 YEARS.

Right bone: The outer antral wall and upper mastoid are cellular, the cells extending inwards to the sulcus jugularis and occipital junction; at the latter spot they are large. The lower mastoid is diploëtic.

Left bone: Very similar to the right, but the cells at the occipital junction are not large, and the cells extend further down the mastoid, the tip of which is diploëtic.

542·1. RIGHT AND LEFT. MALE, 39 YEARS.

The interiors are symmetrical. The outer antral walls and upper mastoids are cellular, the lower mastoids diploëtic.

542·11. RIGHT AND LEFT. MALE, 40 YEARS.

The interiors are symmetrical. The outer antral walls are finely cellular. A few fine cells are present at the inner part of the upper mastoids. The remainder of the mastoids is diploëtic.

542·12. RIGHT AND LEFT. MALE, 40 YEARS.

The interiors are symmetrical and are cellular throughout the outer antral walls and mastoids, with a rim of diploë at the tip of the latter. The right antrum is high-lying to Macewen's triangle, the left is not. The right lateral sinus groove is very much larger than the left. The left was fractured during life; the mastoid cells contained blood; the labyrinth is intact and free of blood.

543·1. RIGHT AND LEFT. MALE, 42 YEARS.

The interiors are symmetrical. The outer antral walls and upper mastoids are cellular; the lower mastoids diploëtic.

The right sulcus jugularis is especially large and high-lying; it has a circular depression on the upper part of the posterior wall, and a well-marked foramen through the floor of the middle ear.

The left lateral sinus groove is more forward at the knee, though not larger than the right.

544·1. RIGHT AND LEFT. MALE, 42 YEARS.

The interiors are symmetrical. The outer antral walls are dense. A few cells are present in the upper mastoids, the remainder being diploëtic.

The middle fossa dips down on both sides, causing sloping roofs to the antra.

The left lateral sinus groove is much larger than the right.

The sulcus jugularis is small on both sides.

545·1. RIGHT AND LEFT. MALE, 43 YEARS.

The interiors are nearly symmetrical. The outer antral walls and entire mastoids are cellular, with rims of diploë at the tips. On the right side only the cells extend backwards over the lateral sinus, and downwards, forming a well-marked digastric bulla.

The right sulcus jugularis is very large and high-lying.

The antrum is high-lying to Macewen's triangle on both sides.

546·1. RIGHT AND LEFT. MALE, 44 YEARS.

The interiors are symmetrical, both bones being of the diploëtic infantile type.

The left antrum is smaller than the right.

547·1. RIGHT AND LEFT. MALE, 45 YEARS.

Right bone: The outer antral wall is dense, and fine cells are present in the upper mastoid; the lower mastoid is diploëtic.

Left bone: Very much the same, but the cells extend to the tip of the mastoid. The lateral sinus groove is slightly, and the sulcus jugularis much larger, than the right.

548·1. RIGHT AND LEFT. MALE, 45 YEARS.

Right bone: The outer antral wall is dense, but not thick, and a few cells run downwards and inwards from the apex of the antrum ; the remainder of the mastoid is diploëtic. The middle fossa dips down on this side only, causing a sloping roof to the antrum.

Left bone : The outer antral wall and upper mastoid are cellular ; the lower mastoid diploëtic. The lateral sinus groove and sulcus jugularis are three times larger than the right.

The antrum on both sides is high-lying to Macewen's triangle.

549·1. RIGHT AND LEFT. MALE, 45 YEARS.

The interiors are symmetrical, both bones being of the diploëtic infantile type.

Both lateral sinus grooves are well forward, reaching the posterior meatal wall, and shutting out the apices of the antra from the surface ; the right is larger.

The right sulcus jugularis is very much larger than the left. The left mastoid vein is much larger than the right.

550·1. RIGHT AND LEFT. MALE, 47 YEARS.

Right bone : The outer antral wall is dense. The upper mastoid and front part of the lower mastoid are cellular, the remainder being diploëtic.

Left bone : Diploëtic infantile type.

The lateral sinus groove and sulcus jugularis are larger than the right ; the former has a deep oval sulcus before its emergence (see Pathological Series, Chronic Middle-Ear Suppuration, No. 53·1).

Mastoid vein canals absent on both sides.

550·11. RIGHT AND LEFT. MALE, 47 YEARS.

The interiors are symmetrical. The outer antral walls and mastoids are cellular, with diploëtic tips to the latter. On the right side cells extend backwards from the antrum and reach the outer extremity of the posterior border.

551·1. RIGHT AND LEFT. MALE, 48 YEARS.

The interiors are symmetrical. The outer antral walls and entire mastoids are cellular, with a rim of diploë at the tip of the latter.

The sulcus jugularis is high-lying on both sides. Just below and behind the vaginal process on the left side the bone is thinned, and there is a perforation (not pathological) leading to the mastoid cells.

552·1. RIGHT AND LEFT. MALE, 48 YEARS.

Right bone: The outer antral wall and mastoid are finely cellular; the tip of the latter diploëtic.

Left bone: The outer antral wall and upper mastoid are cellular, the cells being surrounded by dense bone; the lower mastoid is diploëtic. (See Pathological Series, Chronic Middle-Ear Suppuration, No. 48·1.)

552·11. RIGHT AND LEFT. MALE, 48 YEARS.

The interiors are symmetrical and cellular throughout. On the left side the cells run up to a large and high-lying sulcus jugularis. The left lateral sinus and sulcus jugularis are larger than the right. The right jugular foramen is small.

553·1. RIGHT AND LEFT. MALE, 49 YEARS.

Right bone: The outer antral wall is dense, the upper mastoid finely cellular, and the lower mastoid diploëtic.

Left bone: The outer antral wall is chiefly dense; the mastoid is cellular throughout, with a rim of diploë at the tip.

554·1. RIGHT AND LEFT. MALE, 49 YEARS.

Right bone: Diploëtic infantile type (see Pathological Series, Chronic Middle-Ear Suppuration, No. 61·1).

Left bone: The outer antral wall is dense. A few cells run downwards in the inner part of the upper mastoid; the remainder of the mastoid is diploëtic.

555·1. RIGHT AND LEFT. MALE, 49 YEARS.

Marked asymmetry.

Right bone: The outer antral wall is chiefly dense, a few cells being present in the zygomatic element. The upper mastoid is cellular, the cells running inwards under the semicircular canals and nearly reaching the sulcus jugularis; the lower mastoid is cellular above and diploëtic at the tip.

Left bone: Diploëtic infantile type.

555·11. RIGHT AND LEFT. MALE, 49 YEARS.

Asymmetry.

Right bone: Cellular outer antral wall and upper mastoid. Lower mastoid diploëtic.

Left bone: Diploetic infantile type, with dense outer antral wall with cellular extension backwards from the antrum to a cell in the outer extremity of the posterior border at the junction of the superior petrosal and lateral sinuses.

556·1. RIGHT AND LEFT. MALE, 50 YEARS.

The interiors are symmetrical. The outer antral walls and entire mastoids are cellular, the lower mastoid cells being very large. These cells extend further backwards on the left side.

The descending part of the Fallopian canal is seen from behind with the opening for the chorda tympani.

557·1. RIGHT AND LEFT. MALE, 50 YEARS.

The interiors are symmetrical, both bones being of the diploëtic infantile type. The lateral sinus is forward on both sides.

558·1. RIGHT AND LEFT. MALE, 51 YEARS.

The interiors are nearly symmetrical. The outer antral walls and mastoids are cellular; the tip of the left mastoid is diploëtic; on both sides cells pass through the roof of the meatus and invade the zygoma. On the right side, where the sulcus jugularis is small and low-lying, the cells run inwards under the vestibule and internal auditory meatus and invade the lower part of the apical diploë; on the left side, where the sulcus jugularis is high-lying and much larger than the right, the cells only run up to its outer wall. On the left side is a marked digastric bulla. Both antra are high-lying to Macewen's triangle. The right antrum is larger than the left.

The left lateral sinus is larger and more forward than the right.

559·1. RIGHT AND LEFT. MALE, 51 YEARS.

The interiors are symmetrical. The outer antral walls and upper mastoids are cellular; the lower mastoids are partly cellular and partly diploëtic. On both sides the cells extend inwards and downwards to the digastric fossa, forming a bulla which is larger on the right side.

560·1. RIGHT AND LEFT. MALE, 51 YEARS.

The interiors are nearly symmetrical. The outer antral walls are partly dense and partly cellular. The upper mastoids are cellular, the lower mastoids diploëtic. The upper mastoid cells on the left side extend downwards and inwards more than on the right side.

561·1. RIGHT AND LEFT. MALE, 51 YEARS.

The interiors are symmetrical and cellular throughout. Both antra are high-lying to Macewen's triangle, the right more than the left.

The left lateral sinus groove and sulcus jugularis are larger than the right.

561·11. RIGHT AND LEFT. MALE, 51 YEARS.

Right bone: Finely cellular outer antral wall and upper mastoid. Diploëtic lower mastoid. Cells extend inwards below sulcus jugularis and invade the occipital. The jugular foramen is larger than the right, which is extremely small. Grooving for petrosquamosal sinus with external opening above base of zygoma.

Left bone: Finely cellular outer antral wall. Mastoid cellular, with diploëtic tip.

561·12. RIGHT AND LEFT. MALE, 51 YEARS.

The interiors are symmetrical and cellular throughout, except for some diploë at the tip of the mastoids. On each side the cells run up to the sulcus jugularis. High-lying antrum on both sides.

561·13. RIGHT AND LEFT. MALE, 51 YEARS.

Right bone: Outer antral wall and upper mastoid cellular. Lower mastoid diploëtic.

Left bone: Outer antral wall and upper mastoid cellular. Lower mastoid missing. The sulcus jugularis is larger than the right.

562·1. RIGHT AND LEFT. MALE, 52 YEARS.

Right bone: The outer antral wall and entire mastoid are cellular. Large cells extend downwards and inwards to the digastric fossa, forming a bulla, and inwards to the sulcus jugularis; other cells run over the sulcus and invade the lower part of the apical diploë.

Left bone: Small cells are present in the outer antral wall and upper mastoid, and run downwards and inwards; the lower mastoid is diploëtic. The lateral sinus groove and sulcus jugularis are slightly larger than the right.

563·1. RIGHT AND LEFT. MALE, 52 YEARS.

Right bone: The outer antral wall and mastoid are cellular, with a diploëtic tip to the latter.

Left bone: The outer antral wall is dense, and the mastoid is cellular, with a diploëtic tip.

The right mastoid vein starts double in a sulcus, and emerges double; the left is small and single.

563·11. RIGHT AND LEFT. MALE, 52 YEARS.

The interiors are symmetrical and are cellular throughout.

564·1. RIGHT AND LEFT. MALE, 53 YEARS.

Right bone: A few cells are present in the zygomatic element of the outer antral wall, and are separated from a few fine cells in the upper mastoid by a dense layer of bone; the rest of the mastoid is diploëtic. The lateral sinus groove and the sulcus jugularis are very much larger than the left, which are particularly small. The antrum is high-lying; the posterior zygomatic line has a slight inclination downwards and backwards, and is very close to the meatal spine. The middle fossa dips down between the antrum and the surface.

Left bone: The outer antral wall is cellular, and a few cells run downwards and inwards; the rest of the mastoid is diploëtic. The antrum is not high-lying, and the middle fossa does not dip down.

565·1. RIGHT AND LEFT. MALE, 54 YEARS.

Right bone: A few cells in a dense outer antral wall. Cellular mastoid, with a dense outer cortex; the inner cortex of the lower mastoid is very thin. The anatomical conditions of this bone would favour the formation of a Bezold's abscess—*i. e.* perforation of the inner cortex of the mastoid, with a deep abscess in the neck.

Left bone: Diploëtic infantile type (see Pathological Series, Middle-Ear Suppuration, No. 48·2.)

565·11. RIGHT AND LEFT. MALE, 54 YEARS.

Dense outer antral wall. Cellular upper mastoids. More marked on the left side. Lower mastoids missing.

566·1. RIGHT AND LEFT. MALE, 56 YEARS.

The interiors are symmetrical, and are cellular throughout.

567·1. RIGHT AND LEFT. MALE, 56 YEARS.

Right bone: The outer antral wall is dense. The upper mastoid is cellular, and the lower mastoid diploëtic. The posterior zygomatic line behind the antrum is larger and more prominent than the left. The lateral sinus groove is very large, and the mastoid vein canal is very small.

Left bone: Similar, but the cells are larger and extend further down.

The lateral sinus groove is much smaller, and the mastoid vein canal is much larger, than the right. On this side only the middle fossa dips down, causing a sloping roof to the antrum.

568·1. RIGHT AND LEFT. MALE, 58 YEARS.

The interiors are symmetrical, and are of the diploëtic infantile type.

569·1. RIGHT AND LEFT. MALE, 58 YEARS.

The interiors are symmetrical. The outer antral walls and upper mastoids are cellular, the lower mastoids diploëtic. A specially large sinus tympani is present on both sides, extending outwards beyond the level of the external semicircular canal, where it could be easily opened surgically without injury to the facial nerve.

570·1. RIGHT AND LEFT. MALE, 59 YEARS.

Right bone: The outer antral wall and mastoid are finely cellular, with diploë at the tip of the latter.

Left bone: Diploëtic infantile type. The lateral sinus groove and sulcus jugularis are larger and deeper than the right.

571·1. RIGHT AND LEFT. MALE, 59 YEARS.

Right bone: The outer antral wall is dense; the mastoid is cellular, with a dense tip. The antrum is high-lying to Macewen's triangle.

Left bone: The outer antral wall and mastoid are cellular with a densely diploëtic tip to the latter; the cells are larger than the right and run inwards and downwards to the sulcus jugularis and occipital junction. The lateral sinus groove and sulcus jugularis are larger than the right. The antrum is larger than the right. The middle fossa dips down on this side only causing a sloping roof to the antrum.

The bone behind the mastoid process on both sides is very thick and dense. The patient died of arteriosclerosis and dementia.

572·1. RIGHT AND LEFT. MALE, 59 YEARS.

Right bone: The outer antral wall and mastoid are cellular, with a rim of diploë at the tip of the latter; the lower mastoid cells are very large.

Left bone: The outer antral wall and upper mastoid are cellular and the lower mastoid diploëtic.

The lateral sinus groove and sulcus jugularis are larger and deeper than the right.

The antrum is high-lying on both sides.

572·11. RIGHT AND LEFT. MALE, 59 YEARS.

Marked asymmetry.

Right bone: Outer antral wall and upper mastoid dense, with a cell in the inner aspect of the latter. Lower mastoid densely diploëtic. Ossified stylohyoid ligament.

Left bone: Diploëtic infantile type. Large forward lateral sinus and mastoid vein canal. The lateral sinus and sulcus jugularis are larger than the right.

573·1. RIGHT AND LEFT. MALE, 60 YEARS.

The interiors are symmetrical, and are of the diploëtic infantile type.

For left bone, see Pathological Series, Healed Chronic Middle-Ear Suppuration, No. 79·1.

574·1. RIGHT AND LEFT. MALE, 60 YEARS.

The interiors are symmetrical. The outer antral walls are partly dense and partly cellular; the upper mastoids are cellular, the lower mastoids diploëtic. A large cell from the middle-ear floor is present below the vestibule and cochlea on both sides. The antrum is high-lying to Macewen's triangle on both sides and the middle fossa dips down behind the antrum. For the left bone see Pathological Series, Fracture No. 33·1.

575·1. RIGHT AND LEFT. MALE, 60 YEARS.

Right bone: The outer antral wall is dense. A few cells are present in the upper mastoid. Lower mastoid is diploëtic. Very forward lateral sinus.

Left bone: The outer antral wall and mastoid are cellular, with dense diploë at the tip of the latter. Forward lateral sinus.

575·11. RIGHT AND LEFT. MALE, 60 YEARS.

The interiors are symmetrical. The outer antral walls and mastoids are cellular with diploë at the tip of the latter.

576·1. RIGHT AND LEFT. MALE, 61 YEARS.

The interiors are symmetrical. The outer antral walls are dense; the upper mastoids are finely cellular; the lower mastoids diploëtic.

Both antra are small.

The masto-squamosal suture is well marked on both sides. Grooving for the remains of the petrosquamosal sinus is present on the left side only.

577·1. RIGHT AND LEFT. MALE, 61 YEARS.

The interiors are symmetrical. The outer antral walls and mastoids are cellular with diploë at tip of the latter.

The right mastoid process is larger than the left.

The left lateral sinus groove and sulcus jugularis are larger than the right.

578·1. RIGHT AND LEFT. MALE, 61 YEARS.

Right bone: A few fine cells are present in the outer antral wall and upper mastoid; the remainder of the process is diploëtic. The line of junction of the squamous and petrous elements of the mastoid is well seen.

Left bone: Diploëtic infantile type.

Both lateral sinuses are well forward.

578·11. MALE, 62 YEARS.

The interiors are symmetrical and are of the diploëtic infantile type, with dense outer antral walls.

Both antra are small and sloping in outline, due to the depression of the middle fossa. The lateral sinus is well forward on both sides.

579·1. RIGHT AND LEFT. MALE, 63 YEARS.

Right bone: The outer antral wall and upper mastoid are cellular with a dense cortex. The lower mastoid is densely diploëtic. Large antrum.

Left bone: Very similar to the right, but the cells are more numerous.

580·1. RIGHT AND LEFT. MALE, 64 YEARS.

The interiors are symmetrical. The outer antral walls are dense; a few cells are present in the upper mastoids, the remainder of the processes are diploëtic.

The right bone has had an operation; incomplete radical for mastoid cells still remain. No history.

581·1. RIGHT AND LEFT. MALE, 64 YEARS.

Right bone: The outer antral wall dense above and diploëtic below; the rest of the mastoid is diploëtic. Very large sinus tympani marked in ink. Very large lateral sinus groove and small sulcus jugularis; very small mastoid vein. Middle fossa dips down slightly over the antrum.

Left bone: A thin line of diploë runs through the outer antral wall between the outer compact layer and some cells which continue downwards and inwards into the upper mastoid. The rest of the process is densely diploëtic.

A large sinus tympani is also present.

The middle fossa dips down much more than on the right side.

582·1. RIGHT AND LEFT. MALE, 66 YEARS.

The interiors are practically symmetrical. The outer antral walls and mastoids are cellular with diploë at the tips, more on the left side.

Large digastric bulla on both sides.

582·11. RIGHT AND LEFT. MALE, 66 YEARS.

The interiors are symmetrical. The outer antral walls and mastoids are finely cellular with dense diploë at the tip of the latter. The outer mastoid cortex is dense and thick on both sides.

583·1. RIGHT AND LEFT. MALE, 67 YEARS.

The interiors are symmetrical, both bones being of the diploëtic infantile type.

584·1. RIGHT AND LEFT. MALE, 67 YEARS.

The interiors are symmetrical, both bones being of the diploëtic infantile type.

Both antra are high-lying to Macewen's triangle.

The left lateral sinus groove is larger and more forward and the sulcus jugularis is deeper than the right.

584·11. RIGHT AND LEFT. MALE, 67 YEARS.

The interiors are symmetrical. The outer antral walls are dense. A few cells are present in the upper mastoids the rest of which are diploëtic.

585·1. RIGHT AND LEFT. MALE, 68 YEARS.

The interiors are symmetrical, both bones being of the diploëtic infantile type.

The left lateral sinus, sulcus jugularis and mastoid vein are larger than the right.

586·1. RIGHT AND LEFT. MALE, 68 YEARS.

The interiors are practically symmetrical. The outer antral walls are dense, and cells are present in the upper part of the diploëtic mastoids. The cells are larger and more numerous on the left side.

587·1. RIGHT AND LEFT. MALE, 71 YEARS.

The interiors are symmetrical, both bones being cellular throughout. The antra are large and long. The sulcus jugularis is very large on both sides.

The tympanic plates are much thinned.

588·1. RIGHT AND LEFT. MALE, 71 YEARS.

Right bone: The outer antral wall is dense; a track of cells runs through the upper mastoid and into the upper part of the lower mastoid, the remainder of which is diploëtic.

Left bone: The outer antral wall and upper mastoid are cellular, the lower mastoid diploëtic. The lateral sinus groove and sulcus jugularis are larger than the right, the latter especially so.

589·1. RIGHT AND LEFT. MALE, 72 YEARS.

The interiors are symmetrical. The outer antral walls and upper mastoids are cellular with a dense cortex, the lower mastoids diploëtic.

Both antra are high-lying to Macewen's triangle.

590·1. RIGHT AND LEFT. MALE, 72 YEARS.

Right bone: The outer antral wall and upper mastoid are cellular, the lower mastoid is diploëtic.

Left bone: The outer antral wall is dense. A few cells with dense surroundings are present in the upper mastoid. Lower mastoid partly dense and partly diploëtic.

The antrum is high-lying to Macewen's triangle on both sides. The posterior zygomatic line on both sides runs downwards and backwards.

590·14. RIGHT AND LEFT. MALE, 76 YEARS.

The interiors are symmetrical. The outer antral walls and mastoid are cellular with densely diploëtic tip to the latter. Both antra are high-lying.

591·1. RIGHT AND LEFT. MALE, 80 YEARS.

Right bone : Diploëtic infantile type.

Left bone : The outer antral wall is dense and there are a few cells in the upper mastoid ; the rest of the mastoid is diploëtic.

592·1. RIGHT AND LEFT. MALE, 82 YEARS.

Right bone : The outer antral wall and mastoid are cellular with a rim of diploë at the tip of the latter. Very large lateral sinus groove. Mastoid vein starts single and emerges double.

Left bone : The outer antral wall is dense and the mastoid cellular with a rim of diploë at the tip. The mastoid vein is single at start and emergence. The cells on both sides run down to the digastric fossa, forming a bulla on the left but not on the right.

FEMALES.

593·01. RIGHT AND LEFT. FEMALE, 3 MONTHS.

The interiors are symmetrical. The cut surfaces show the arrangement of the diploë.

593·011. FEMALE, 3 MONTHS.

The interiors are symmetrical and are of the diploëtic infantile type.

There are marked groovings for the petro-squamosinus on both sides, with anterior openings in the base of the zygoma. On the left side there are two openings.

593·02. RIGHT AND LEFT. FEMALE, 5 MONTHS.

The interiors are symmetrical. Very little diploë compared to 593·01.

593·03. RIGHT AND LEFT. FEMALE, 11 MONTHS.

The interiors are symmetrical. Diploëtic type still ; no sign of cellular formation.

593·04. RIGHT AND LEFT. FEMALE, 1 YEAR AND 5 MONTHS.

The interiors are symmetrical. No sign of cellular formation. The mastoid diploë is very dense on both sides.

593·05. FEMALE, 1 YEAR AND 6 MONTHS.

The interiors are symmetrical. The antra are large and dip well down.

593·1. RIGHT AND LEFT. FEMALE, 1 YEAR AND 7 MONTHS.

The interiors are symmetrical and are still of the diploëtic infantile type.

594·1. RIGHT AND LEFT. FEMALE, 2 YEARS.

The interiors are symmetrical. Long, large antra. The cells extending through upper mastoids. Lower mastoids diploëtic.

On both sides cells from the middle-ear floor extend inwards over the sulcus jugularis and under the vestibule and first turn of the cochlea.

594·11. FEMALE, 2 YEARS AND 4 MONTHS.

The interiors are symmetrical and are cellular throughout the outer antral walls and mastoids.

The left sulcus jugularis and foramen are larger than the right.

Cells from the middle ear floor are running under the cochlea and over the sulcus jugularis on the right side.

594·2. RIGHT AND LEFT. FEMALE, 5 YEARS.

The interiors are symmetrical. The outer antral walls are cellular. The squamous elements of the mastoids are cellular and cells are beginning to invade the petrous element of the mastoid on the right side. The left lateral sinus groove and sulcus jugularis are larger than the right.

595·1. RIGHT AND LEFT. FEMALE, 6 YEARS.

The interiors are symmetrical. The outer antral walls and squamous portions of mastoids are cellular, the petrous portions of mastoids are diploëtic.

The left sulcus jugularis is larger than the right.

596·1. RIGHT AND LEFT. FEMALE, 6 YEARS.

The interiors are symmetrical. Long, large antra with cellular outer walls extending nearly to the tip of the mastoid, which is diploëtic. The cells from the apex of the antrum are invading the remaining diploë.

596·11. RIGHT AND LEFT. FEMALE, 6 YEARS.

Right bone: Outer antral wall partly dense and partly cellular. Upper mastoid cellular. Lower mastoid diploëtic.

Left bone: Incomplete.

596·12. RIGHT AND LEFT. FEMALE, 6 YEARS.

The interiors are symmetrical. The outer antral walls and upper mastoids are cellular. Lower mastoids diploëtic.

596·13. RIGHT AND LEFT. FEMALE, 6 YEARS.

Right bone: Dense outer antral wall. A few cells in upper mastoid along the squamo-mastoid junction, remaider of mastoid diploëtic.

Left bone: Outer antral wall partly dense and partly cellular, a few cells in upper mastoid. The lateral sinus groove is larger and more forward and the sulcus jugularis is larger than the right.

597·1. RIGHT AND LEFT. FEMALE, 16 YEARS.

The interiors are symmetrical. The outer antral walls and entire mastoids are cellular.

The cells extend inwards past the facial nerve, and joining with cells from the middle-ear floor extend inwards under the cochlea and over the sulcus jugularis reaching the lower part of the apical diploë. On the left side these cells can be seen passing under the vestibule and internal auditory meatus.

597·11. RIGHT AND LEFT. FEMALE, 16 YEARS.

The interiors are symmetrical. The outer antral walls are dense, a few cells are present at the squamo-mastoid junction and at the inner apect of the lower mastoids.

598·1. RIGHT AND LEFT. FEMALE, 21 YEARS.

The interiors are symmetrical. The outer antral walls and entire mastoids are cellular.

599·1. RIGHT AND LEFT. FEMALE, 21 YEARS.

The interiors are symmetrical and are of the diploëtic infantile type. The diploë is very dense. The middle fossa dips down, causing a sloping roof to the antrum on both sides, more marked on the right.

600·1. RIGHT AND LEFT. FEMALE, 22 YEARS.

The interiors are symmetrical. The outer antral walls are dense, the upper mastoids finely cellular, the lower mastoids diploëtic. The cells on the left side are larger and extend further down and just invade the upper part of the lower mastoid. The lateral sinus grooves are about equal in size.

The right mastoid vein is larger than the left.

601·1. RIGHT AND LEFT FEMALE, 23 YEARS.

The interiors are nearly symmetrical and are cellular throughout. There is diploë at the tip of the right mastoid and not on the left. The cells extend inwards to the sulcus jugularis on the left side and not on the right. The left lateral sinus groove and sulcus jugularis are larger than the right.

602·1. RIGHT AND LEFT. FEMALE, 25 YEARS.

The interiors are symmetrical. The outer antral walls and entire mastoids are cellular. The cells on the left side extend below and over the lateral sinus groove.

The middle fossa dips down on the right side only, causing a sloping roof to the antrum. Many gaps are present in the outer antral wall on the left side only.

602·12. RIGHT AND LEFT. FEMALE, 27 YEARS.

Right bone: The outer antral wall is partly dense and partly cellular. The upper mastoid is cellular, the lower mastoid diploëtic.

Left bone: The outer antral wall is dense. A few cells are present in the inner part of the upper mastoid, the remainder of which is diploëtic. The lateral sinus groove is larger and more forward than the right.

603·1. RIGHT AND LEFT. FEMALE, 28 YEARS.

The interiors are symmetrical. The outer antral walls and mastoids are cellular. Well-marked digastric bulla on both sides. The antra are rather high-lying to Macewen's triangle. The left lateral sinus groove, mastoid vein canal and sulcus jugularis are much larger than the right.

604·1. RIGHT AND LEFT. FEMALE, 28 YEARS.

The interiors are symmetrical, and are of the diploëtic infantile type. The right outer antral wall is dense, the left has a thin line of diploë running through it. Diploë in the zygomatic element very marked on both sides.

The right antrum abuts on to the lateral sinus groove, the partition being very thin.

Both lateral sinus grooves are large and about equal in size.

Very large digastric fossæ, the left being much larger than the right.

605·1. RIGHT AND LEFT. FEMALE, 29 YEARS.

Right bone: Diploëtic infantile type.

Left bone: Very similar to the right, but a group of fine cells is present in the otherwise dense outer antral wall—a rare condition.

606·1. RIGHT AND LEFT. FEMALE, 30 YEARS.

The interiors are symmetrical. The outer antral walls and entire mastoids are finely cellular. The antra are large. The middle fossa dips down on the right side only, depressing the roof of the antrum at the petro-squamous junction.

For left bone see Pathological Series, tumour of auditory nerve causing dilatation of the internal auditory meatus, No. 99·1.

606·3. RIGHT AND LEFT. FEMALE, 32 YEARS.

The interiors are symmetrical and cellular throughout.

607·1. RIGHT AND LEFT. FEMALE, 33 YEARS.

Right bone: Diploëtic infantile type, with a thin layer of diploë running through the outer antral wall between the outer compact layer and the dense inner layer. The lateral sinus groove is well forward. Large digastric fossa.

Left bone: The outer antral wall is dense. A few cells run downwards and inwards from the apex of the antrum through the upper mastoid; the lower mastoid is diploëtic. The sulcus jugularis is larger than the right.

608·1. RIGHT AND LEFT. FEMALE, 36 YEARS.

Right bone: The outer antral wall mostly dense, with a few small cells. Fine cells in the upper mastoid and upper part of lower mastoid; the tip of the latter is densely diploëtic.

Left bone: Much the same as the right, but the cells are larger. The lateral sinus groove, sulcus jugularis, and mastoid vein are larger than the right.

608·11. RIGHT AND LEFT. FEMALE, 36 YEARS.

Marked asymmetry.

Right bone: Cellular throughout.

Left bone: Diploëtic infantile type, with dense outer antral wall.

608·12. RIGHT AND LEFT. FEMALE, 36 YEARS.

The interiors are symmetrical. The outer antral walls and mastoids are cellular. The left sulcus jugularis is larger than the right.

608·13. RIGHT AND LEFT. FEMALE, 36 YEARS.

The interiors are symmetrical. The outer antral walls and mastoids are cellular.

609·1. RIGHT AND LEFT. FEMALE, 37 YEARS.

Right bone: Diploëtic infantile type. Forward lateral sinus groove larger than the left above, but the mastoid vein canal is much larger than the left, and makes the lateral sinus groove and sulcus jugularis somewhat smaller than the left after its exit.

Left bone: The outer antral wall is dense. The antrum is long and narrow. A few fine cells in the upper mastoid; lower mastoid is diploëtic. The line of demarcation between the squamous and petrous elements of the mastoid is well seen. The middle fossa dips down behind and externally to the antrum, and not on the right.

Forward lateral sinus groove. Mastoid vein canal is rudimentary.

610·1. RIGHT AND LEFT. FEMALE, 38 YEARS.

The interiors are symmetrical, and are cellular throughout, but the cell walls on the right side are denser than the left.

Large knee to the lateral sinus groove on both sides.

Huschke's foramen still enclosed by bone on both sides.

611·1. RIGHT AND LEFT. FEMALE, 41 YEARS.

Marked asymmetry.

Right bone: Cellular throughout.

Left bone: Diploëtic infantile type.

612·1. RIGHT AND LEFT. FEMALE, 42 YEARS.

The interiors are symmetrical, and are of the diploëtic infantile type.

613·1. RIGHT AND LEFT. FEMALE, 43 YEARS.

Right bone: A few fine cells are present in the outer antral wall and throughout the mastoid, with dense surroundings. Tip of mastoid diploëtic. Very small antrum. Forward lateral sinus. Mastoid vein canal single at start and double at emergence.

Left bone: Diploëtic infantile type. Small antrum. The lateral sinus groove is well forward, and is smaller than the right. The mastoid vein canal is single and very small. The sulcus jugularis is much larger than the right.

613·2. RIGHT AND LEFT. FEMALE, 44 YEARS.

Right bone: Finely cellular throughout, cells extending to digastric fossa forming a bulla.

Left bone: Incomplete.

614·1. RIGHT AND LEFT. FEMALE, 46 YEARS.

Right bone: The outer antral wall is dense, with a few small cells. The mastoid is cellular except for the tip, which is diploëtic.

Left bone: Much the same as the right, but the cells are much smaller and have dense surroundings. The lateral sinus groove and sulcus jugularis are much larger than the right.

615·1. RIGHT AND LEFT. FEMALE, 48. YEARS.

Marked asymmetry.

Right bone: Diploëtic infantile type. Very large up-pushing sulcus jugularis.

Left bone: The outer antral wall is dense. The upper mastoid is cellular; the lower mastoid diploëtic. Marked grooving for the petro-squamosal sinus.

Marked dipping down of the middle fossa behind the antrum on both sides.

616·1. RIGHT AND LEFT. FEMALE, 48 YEARS.

The interiors are symmetrical and are cellular throughout. The outer wall of the right mastoid and tip have a denser cortex than the left.

The right lateral sinus is well forward, especially at the knee, where it pushes in the postero-internal wall of the antrum.

The mastoid vein canal is fairly large on both sides.

617·1. RIGHT AND LEFT. FEMALE, 49 YEARS.

The interiors are symmetrical and are cellular throughout. Both antra are long and narrow.

The lateral sinus groove on the left side runs very high up posteriorly.

The cerebral aspect of the left squama is very nodular. Patient was a melancholic.

618·1. RIGHT AND LEFT. FEMALE, 50 YEARS.

The interiors are symmetrical and are cellular throughout. There is diploë at the tip of the left mastoid, but not of the right. The cells run over the digastric fossa to the sulcus jugularis on both sides, those of the right being larger and more numerous.

The right lateral sinus groove is twice as large as the left.

619·1. RIGHT AND LEFT. FEMALE, 50 YEARS.

The interiors are symmetrical, and are of the diploëtic infantile type. Both antra are very small. The left lateral sinus groove, which is well forward, and the sulcus jugularis are larger than the right.

For the left bone, see Pathological Series, Chronic Middle-Ear Suppuration, No. 46·1.

619·11. RIGHT AND LEFT. FEMALE, 52 YEARS.

Asymmetry.

Right bone: The outer antral wall is dense and a few small cells are present at the inner aspect of the upper mastoid. The rest of the mastoid is diploëtic. Large antrum.

Left bone: Similar to the right, but a large cell is present in the upper mastoid.

620·1. RIGHT AND LEFT. FEMALE, 53 YEARS.

The interiors are symmetrical, and are of the diploëtic infantile type, the mastoid diploë being particularly dense. Both antra are large, the right being larger than the left.

The right lateral sinus groove is well forward and very large, being about six times larger than the left, which is unusually small. The right sulcus jugularis is not large or deep, and the mastoid vein canal is small.

620·11. RIGHT AND LEFT. FEMALE, 53 YEARS.

The outer antral walls and mastoids are cellular. On the right side only is a well marked digastric bulla, and on the left side the cells extend backwards to the junction of the superior and lateral sinuses.

621·1. RIGHT AND LEFT. FEMALE, 54 YEARS.

Marked asymmetry.

Right bone: Diploëtic infantile type. A very large lateral sinus groove extends so far forward as to reach the posterior meatal wall; it shuts out the back part and apex of the antrum from the surface.

Left bone: The outer antral wall is partly dense and partly cellular. The mastoid is cellular except for the tip, which is diploëtic.

The lateral sinus is small and well forward, but does not reach the posterior meatal wall.

622·1. RIGHT AND LEFT. FEMALE, 54 YEARS.

The interiors are symmetrical, and are of the diploëtic infantile type.

The left lateral sinus groove and sulcus jugularis are larger than the right.

For the left bone, see Pathological Series, Chronic Middle-Ear Suppuration, No. 55·1.

623·1. RIGHT AND LEFT. FEMALE, 54 YEARS.

The interiors are nearly symmetrical.

The squamous elements of the mastoids are dense, the left having a few cells in it.

The mastoids are cellular, but the left has diploë at the tip.

623·11. RIGHT AND LEFT. FEMALE, 54 YEARS.

The interiors are symmetrical and are cellular throughout. On the right side the cells run inwards to the sulcus jugularis and occipital junction.

623·12. FEMALE, 54 YEARS.

The interiors are symmetrical. The outer antral walls and upper mastoids are finely cellular, the lower mastoids are diploëtic. The cells run inwards to the sulcus jugularis on both sides. The left lateral sinus groove is larger than the right.

624·1. RIGHT AND LEFT. FEMALE, 55 YEARS.

The interiors are symmetrical. A few cells are present in the dense outer antral walls and upper mastoids, the remainder of which are diploëtic.

625·1. RIGHT AND LEFT. FEMALE, 55 YEARS.

Right bone: Outer antral wall and upper mastoid are cellular; lower mastoid is diploëtic.

Left bone: Outer antral wall is dense. A few cells in the upper mastoid; lower mastoid diploëtic.

626·1. RIGHT AND LEFT. FEMALE, 55 YEARS.

The interiors are symmetrical. The outer antral walls and entire mastoids are cellular. The cortex of the mastoids is dense. Both antra are long and narrow.

The outer opening for the right mastoid vein is very far back.

627·1. RIGHT AND LEFT. FEMALE, 56 YEARS.

Very marked asymmetry.

Right bone: Diploëtic infantile type. The middle fossa dips down, causing a sloping roof to the antrum. Forward lateral sinus groove.

Left bone: Cellular throughout with a narrow rim of diploë at the tip of the mastoid. The lower cells are very large and run over and under the lateral sinus groove. There is an extension of cells inwards below the semicircular canals reaching the sulcus jugularis and the occipital junction. The middle fossa does not dip down as on the right side.

628·1. RIGHT AND LEFT. FEMALE, 56 YEARS.

The interiors are symmetrical and are cellular throughout. The apical diploëtic masses are replaced by cells. The middle fossa dips down externally to the antrum on the left side only.

629·1. RIGHT AND LEFT. FEMALE, 57 YEARS.

The interiors are symmetrical and are cellular throughout. The antra are very large. The apical masses of diploë are replaced by dense bone.

The left lateral sinus groove and sulcus jugularis are larger than the right.

The middle fossa dips down slightly on both sides; more so on the right.

630·1. RIGHT AND LEFT. FEMALE, 59 YEARS.

Right bone: The outer antral wall is dense and there are a few small cells in the upper mastoid; the remainder of the mastoid is diploëtic.

Left bone: Is similar to the right, but there are more cells in the mastoid.

The middle fossa dips down on both sides, but more on the left.

631·1. RIGHT AND LEFT. FEMALE, 61 YEARS.

The interiors are practically symmetrical, being cellular throughout, but the right has a rim of diploë at the tip of the mastoid. On both sides the cells extend inwards up to and over the sulcus jugularis and under the semicircular canals, vestibule and cochlea. On the left side the middle fossa dips down, causing a sloping roof to the antrum.

632·1. RIGHT AND LEFT. FEMALE, 61 YEARS.

The interiors are symmetrical. The outer antral walls are dense, and there are cells throughout the mastoid except at the tip, where there is a rim of diploë.

The left lateral sinus groove is small and only slightly marked.

For the right bone see Pathological Series, Deformity of the External Semicircular Canal, No. 103·1.

633·1. RIGHT AND LEFT. FEMALE, 61 YEARS.

Marked asymmetry.

Right bone: Diploëtic infantile type. The elements of which the outer antral wall and mastoid are formed are well marked off from one another. The middle fossa dips down, causing a sloping roof to the antrum.

Double mastoid vein with a sulcus at one of the exits.

Left bone: Cellular throughout. Large single mastoid vein canal.

634·1. RIGHT AND LEFT. FEMALE, 62 YEARS.

The interiors are nearly symmetrical and are cellular throughout. The cells extend inwards up to and over the sulcus jugularis, but on the left side they are seen invading the lower part of the apical diploëtic mass; they are also invading the occipital bone, forming an occipital bulla. Digastric bulla on both sides. Both antra are high-lying, the right more than the left. The left lateral sinus groove and sulcus jugularis are larger and deeper than the right. The left mastoid vein canal has a sulcus at its exit.

635·1. RIGHT AND LEFT. FEMALE, 62 YEARS.

The interiors are symmetrical and are cellular throughout.

636·1. RIGHT AND LEFT. FEMALE, 62 YEARS.

The interiors are cellular, but the right has a diploëtic mastoid tip.

636·11. RIGHT AND LEFT. FEMALE, 62 YEARS.

The interiors are symmetrical. The outer antral walls and upper mastoids are finely cellular. Lower mastoids diploëtic. Right jugular foramen is three times as large as the left.

637·1. RIGHT AND LEFT. FEMALE, 63 YEARS.

Right bone: Diploëtic infantile type. Rather large mastoid vein canal.

Left bone: Similar to the right, but some fine cells are present in the outer antral wall. Mastoid vein canal is very small.

The middle fossa dips down on both sides, but more on the left.

638·1. RIGHT AND LEFT. FEMALE, 63 YEARS.

Right bone: The outer antral wall is dense. The mastoid is cellular with a diploëtic tip.

Left bone: The outer antral wall and upper mastoid are cellular; the lower mastoid is densely diploëtic. Large antrum on both sides.

639·1. RIGHT AND LEFT. FEMALE, 64 YEARS.

Right bone: The outer antral wall is dense. The upper mastoid cellular; the lower mastoid diploëtic.

Left bone: The outer antral wall is dense. The mastoid is cellular except for the tip, which is diploëtic.

The sulcus jugularis is large and high-lying on both sides, but the left is larger than the right.

640·1. RIGHT AND LEFT. FEMALE, 64 YEARS.

The interiors are symmetrical and are cellular throughout. The cells extend into the digastric fossæ forming digastric bullæ, the left being the larger. Masto-squamosal suture well marked on both sides, more on the right.

641·1. RIGHT AND LEFT. FEMALE, 66 YEARS.

The interiors are nearly symmetrical and are cellular throughout, but the cells extend up into the squama on the right side and not on the left. A narrow rim of diploë is present at the tip of the left mastoid only.

The left masto-squamosal suture is more marked than the right.

The left lateral sinus groove and sulcus jugularis are very small, the right very large.

642·1. RIGHT AND LEFT. FEMALE, 71 YEARS.

Right bone: The outer antral wall and upper mastoid are cellular; the lower mastoid is densely diploëtic.

Left bone: The outer antral wall and mastoid are cellular throughout, the cells extending backwards over the lateral sinus. The middle fossa dips down, causing a sloping roof and outer wall to the antrum, and not on the right.

643·1. RIGHT AND LEFT. FEMALE, 72 YEARS.

The interiors are symmetrical and are cellular throughout. A roughly circular pocket perforated to the surface is present in the lateral sinus groove just before its exit.

644·1. RIGHT AND LEFT. FEMALE, 73 YEARS.

Marked asymmetry.

Right bone: Diploëtic infantile type, the diploë being very dense. High-lying sulcus jugularis. The middle fossa dips down, causing a sloping roof to the antrum.

Left bone: Cellular throughout, except for the tip of the mastoid, which is densely diploëtic. The middle fossa dips down.

645·1. RIGHT AND LEFT. FEMALE, 77 YEARS.

The interiors are symmetrical and are of the diploëtic infantile type. On the left side the middle fossa dips down markedly, causing a very sloping roof to the antrum.

For the right bone see Pathological Series, Chronic Middle-Ear Suppuration, No. 60·1

646·1. RIGHT AND LEFT. FEMALE, 81 YEARS.

Marked asymmetry.

Right bone: Diploëtic infantile type. Small antrum. A marked groove running forwards and inwards from the hiatus Fallopii.

Left bone: A few cells in a dense outer antral wall and in the upper mastoid running downwards and inwards. Lower mastoid diploëtic.

647·1. RIGHT AND LEFT. FEMALE, 86 YEARS.

The interiors are symmetrical and are cellular throughout. The antra are long and narrow, and are continued through the upper mastoids. The cells run over the digastric fossæ.

650·1. RIGHT AND LEFT. FEMALE, 89 YEARS.

Right bone: The outer antral wall is dense, the upper mastoid cellular, the lower mastoid diploëtic.

No mastoid vein canal to be detected.

Left bone: The outer antral wall is dense. The mastoid is cellular except for the tip, which is dense; the cells run inwards to the sulcus jugularis. The lateral sinus groove and sulcus jugularis are larger and deeper than the right. No mastoid vein canal to be detected.

FOURTH SERIES.

SPECIAL SPECIMENS AND DISSECTIONS.

651·1 *et seq.*

651·1. RIGHT. CHILD.

Anterior meatal wall removed to show the membrana tympani.

652·1. LEFT. INFANT.

Shrapnell's membrane removed to show structures behind. Chorda tympani well seen.

653·1. LEFT. CHILD OF ABOUT 3 YEARS.

Outer antral and most of the attic walls removed. Ossicles and membrane in position.

654·1. LEFT. ADULT.

Dissection to show the inner wall of the middle-ear tract and the mastoid cells. Ossicles in position.

655·1. LEFT. ADULT.

Dissection to show the stapes and incus joint and the inner and posterior middle-ear walls.

656·1. LEFT. ADULT.

Dissection to show a large sinus tympani, which is laid open below the loop of the external semicircular canal and behind the descending part of the facial nerve. The smooth postero-internal wall of the cavity is formed by the inferior crux of the posterior semicircular canal. A fine wire is passed through the small opening of the sinus into the posterior wall of the middle ear internally to the facial nerve, which is represented by another piece of wire.

657·1. RIGHT. ADULT.

Dissected to show the relation of the lateral sinus to the mastoid cells in a very cellular bone.

657·11. Specimen illustrating Schwartze's operation.

658·1. LEFT. CHILD.

Dissected to show the course of the facial nerve.

659·1. RIGHT. ADULT.

The bone sectioned and dissected to show the course of the facial nerve (marked in yellow). The membrane and ossicles are in position.

Presented by Dr. Balmanno Squire.

660·1. LEFT. ADULT.

Dissected to show the course of the facial nerve in relation to the middle ear.

661·1. RIGHT. ADULT.

Parts removed to show the relation of the facial nerve to the radical operation. The specimen shows Hugh Jones's line, which is a guide in avoiding injury to the descending part of the facial nerve while removing the posterior meatal wall. An imaginary line (marked in red) is drawn from the outermost part of the external semicircular canal to the highest point of the floor of the meatus; all the bone externally to this line may be safely removed.

662·1. LEFT. ADULT.

Dissected to show the course of the facial nerve (marked in red) through the bone after it has entered the middle ear.

662·11. RIGHT. MALE, 30 YEARS.

Specimen showing Macewen's triangle, the guide to the antrum.

The posterior zygomatic line, the posterior superior edge of the meatus and a vertical line along the posterior meatal wall.

In this triangle the bone has numerous small perforations for blood-vessels, and the supra-meatal spine is at the apex.

The roof of the antrum has been removed.

662·12. Specimen illustrating the radical operation.

663·1. RIGHT. ADULT.

Showing the descending part of the Fallopian canal in very close relationship to a high up-pushing sulcus jugularis.

664·1. RIGHT. YOUNG SUBJECT.

Dissected to show the relationship of the middle-ear structures to the bony labyrinth. The vestibule, cochlea, and internal auditory meatus are opened.

Presented by Dr. Balmanno Squire.

665·1. RIGHT. AT BIRTH AND ADULT.

Both showing the inner wall of the middle-ear tract for comparison, and the parts of the bony labyrinth which form it.

666·1. RIGHT. TWO BONY LABYRINTHS.

One unopened and the other opened.

Presented by Dr. Balmanno Squire.

667·1. RIGHT. ADULT.

Dissected to show the bony labyrinth, all the cavities of which have been opened.

Presented by Dr. Balmanno Squire.

668·1. RIGHT. ADULT.

Dissected to show the course of the facial nerve through the bone and its relationship to the external semicircular canal and oval window. The membrane and ossicles have been removed.

Presented by Dr. Balmanno Squire.

669·1. RIGHT. ADULT.

Dissected to show the relationship of the facial nerve (marked in yellow) to the vestibule.

Presented by Dr. Balmanno Squire.

670·1. RIGHT. ADULT.

Horizontal section through the internal auditory meatus, cochlea, vestibule, carotid canal, middle-ear tract, and external auditory meatus.

Presented by Dr. Balmanno Squire.

671·1. RIGHT. YOUNG SUBJECT.

Dissected to show the outer and inner aspects of the outer labyrinthine wall and their relationships to the middle-ear tract.

Presented by Dr. Balmanno Squire.

672·1. RIGHT. CHILD.

Dissected to show the semicircular canals, which are opened, and their openings into the vestibule.

Presented by Dr. Balmanno Squire.

673·1. RIGHT. ADULT.

Vertical section through the external auditory meatus, vestibule, and internal auditory meatus.

Presented by Dr. Balmanno Squire.

674·1. RIGHT. ADULT.

Dissected to show the inner wall of the vestibule and its relationship to the oval window and internal auditory meatus. The first turn of the cochlea is opened. The relationship of the cochlea to the carotid canal is well shown.

Presented by Dr. Balmanno Squire.

675·1. LEFT. INFANT.

Dissected to show the relationship of the bony labyrinth to the surface.

676·1. RIGHT. ADULT.

Part of a right petrous bone, illustrating the surgical anatomy of the vestibulotomies. The canal of the facial nerve is opened and coloured red ; the areas of the outer labyrinth wall, which are removed in the operations, are coloured black.

Presented by C. Ernest West, Esq., F.R.C.S., 1913.

677·1. RIGHT. ADULT.

Inferior vestibulotomy. The opening has been extended forwards to include the commencement of the first turn of the cochlea.

Presented by C. Ernest West, Esq., F.R.C.S., 1913.

678·1. RIGHT. ADULT.

Double vestibulotomy. The facial nerve remains supported upon a bridge of bone between the two openings. This is the operation which has also been described by Milligan as the "bridge operation."

Presented by C. Ernest West, Esq., F.R.C.S., 1913.

679·1. RIGHT. ADULT.

Dissection of a right petrous bone to illustrate the surgical anatomy of the operation of translabyrinthine drainage of the basal meninges. The cochlea, vestibule, and external semicircular canal have been opened from above, and the roof of the tympanum removed. Note that the opening through the inner wall of the vestibule passes through the area cribrosa inferior and lies well away from the facial nerve. The opening passes directly into the subarachnoid sheath of the seventh and eighth nerves.

Presented by C. Ernest West, Esq., F.R.C.S., 1913.

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